

Final 2011 Site Management Plan

Allegany Ballistics Laboratory Rocket Center, West Virginia



Prepared for

Department of the Navy

Naval Facilities Engineering Command
Atlantic Division

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Prepared by

CH2MHILL.

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Chantilly, Virginia

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Acronyms and Abbreviations

ABL Allegany Ballistics Laboratory

AOC Area of Concern

ARAR Applicable or Relevant and Appropriate Requirement

ASI Advanced Site Inspection
AST Aboveground Storage Tank

ATK Tactical Propulsion and Controls

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

COC Constituent of Concern

COPC Constituent of Potential Concern

CS Confirmation Study

DERA Defense Environmental Restoration Account

DNAPL Dense Non-aqueous Phase Liquid

DoD Department of Defense

EE/CA Engineering Evaluation/Cost Analysis
ERN Environmental Restoration Navy

FFA Federal Facility Agreement
FFS Focused Feasibility Study

FS Feasibility Study
FY Fiscal year

GIS Geographic Information System

gpm gallons per minute

GPS Global Positioning System

Hercules Hercules Aerospace Corporation

HMX octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine

IAS Initial Assessment Study

Interim RI Interim Remedial Investigation IRP Installation Restoration Program

LC low concentration

LNAPL light non-aqueous phase liquid

MDE Maryland Department of the Environment

MNA Monitored Natural Attenuation

NACIP Navy Assessment and Control of Installation Pollutants Program

NAVFAC Naval Facilities Engineering Command Atlantic Division

NAVFACENGCOM Naval Facilities Engineering Command

NAVSEA Naval Sea Systems Command

NCP National Oil and Hazardous Substances Pollution Contingency Plan

NEESA Naval Energy and Environmental Support Activity

NFA No Further Action

NFESC Naval Facilities Engineering Service Center

NG Nitroglycerine

NPL National Priorities List

PA/SI Preliminary Assessment/Site Inspection

PAH Polyaromatic hydrocarbon
PCB Polychlorinated biphenyl
PCE Tetrachloroethene
PETN pentaerythritol biphenyl

Phase II RI Phase II Remedial Investigation

PR Preliminary Review

PRAP Proposed Remedial Action Plan
PRG Preliminary Remediation Goal

PWA Production Well "A"
PWC Production Well "C"

RA Remedial Action

RAB Restoration Advisory Board RBC Risk-Based Concentration

RCRA Resource Conservation and Recovery Act

RD Remedial Design

RD/RA Remedial Design/Remedial Action
RDX Hexahydro-1,3,5-trinitro-1,3,5-triazine

RFA RCRA Facility Assessment
RFI RCRA Facility Investigation
RI Remedial Investigation

RI/FS Remedial Investigation/Feasibility Study

ROD Record of Decision

RPM Remedial Project Manager

SAA satellite accumulation area

SARA Superfund Amendment and Reauthorization Act

SI Site Investigation
SMP Site Management Plan
SSA Site Screening Area
SSP Site Screening Process

SVOC semi-volatile organic compound SWMU Solid Waste Management Unit

TAL Target Analyte List
TCE Trichloroethene
TCL Target Compound List

TNT Trinitrotoluene

TPH total petroleum hydrocarbon
TSCA Toxic Substance Control Act

USEPA U.S. Environmental Protection Agency

UFP SAP Uniform Federal Policy Sampling and Analysis Plan

VOC volatile organic compound VSI Visual Site Inspection

WVDEP West Virginia Department of Environmental Protection

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Introduction

This document is the 2011 Site Management Plan (SMP) for the Allegany Ballistics Laboratory (ABL) located in Rocket Center, West Virginia. The SMP has been prepared by CH2M HILL for use by Naval Facilities Engineering Command Atlantic Division (NAVFAC), Naval Sea Systems Command (NAVSEA), U.S. Environmental Protection Agency (USEPA) Region III, and West Virginia Department of Environmental Protection (WVDEP).

This SMP is organized into five sections as described below:

- 1. Introduction This section describes the purpose and organization of the SMP, a facility description, the environmental history, and previous investigations conducted at ABL.
- 2. Unit Descriptions and Tracking Matrix This section describes the units included in the FFA for further investigation, summarizes activities conducted to date including removal activities, and documents the status of each unit.
- 3. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Process Activities This section summarizes the process for investigation, feasibility study, and remedial action for CERCLA Installation Restoration Program (IRP) sites. It also describes how team partnering has been applied to streamline the CERCLA process.
- 4. Site Management Plan Schedules This section provides the scheduling assumptions and SMP project schedules
- 5. References This section lists all the references that were consulted for the preparation of this SMP.

1.1 Site Management Plan Purpose

The purpose of the SMP is to provide a management tool for the Navy, USEPA, and WVDEP to plan, schedule, and set priorities for environmental remedial response activities to be conducted at ABL. This SMP focuses on activities and schedules for response actions planned from Fiscal Year 2012 through the ABL project end date.

The Plant 1 portion of ABL was proposed by the USEPA for inclusion on the National Priorities List (NPL) in the *Federal Register*, in June 1993. Plant 1 of ABL was added to the NPL at *Federal Register*, Volume 59, Number 27989, on May 31, 1994. Under the "Federal Facilities" section of the NPL, federal agencies are considered responsible for conducting most of the response actions at facilities under their jurisdiction. A Federal Facilities Agreement (FFA) between USEPA Region III, WVDEP, and the Navy was finalized in January 1998, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). An SMP was developed as part of the FFA to establish deadlines and milestones for performing the environmental activities and submitting associated deliverables. The SMP is updated annually to revise established schedules for these deadlines and milestones.

This SMP is intended to serve as a comprehensive management and educational tool for current and future remedial project managers (RPMs) or other interested parties, by providing a brief description, history, and summary of previous investigations and remedial actions for FFA sites. Laboratory data from previous investigations at these sites are not included in the SMP; however, references are provided to indicate where such data can be found. In addition, analytical data for the facility are maintained in a master database linked to the ABL desktop environmental Geographic Information System (GIS) updated in July 2011. The SMP also presents the rationale for the sequence of past, present, and future environmental investigations and remedial response activities for each site and the estimated schedule for completion of these activities.

1.2 Facility Description

1.2.1 Facility Name, Location, and Description

ABL is located in Mineral County in the northeastern part of West Virginia, approximately 10 miles southwest of Cumberland, Maryland along the West Virginia and Maryland border (Figure 1-1). The facility lies between the North Branch Potomac River, to the north and west, and Knobly Mountain, to the south and east. Several small towns are located near the facility, including Short Gap, West Virginia, to the southeast, and Pinto, Maryland, to the north (Figure 1-2).

ABL consists of about 1,634 acres of land with about 350 buildings (Figure 1-3). The facility is divided into two distinct operating plants:

- Plant 1, which occupies about 1,577 acres (including a large undeveloped area), is owned by the Navy and leased to its operator, ATK Tactical Propulsion and Controls (ATK), by NAVSEA through a Facilities Use Contract. Approximately 400 acres of Plant 1 (the majority of the developed portion of ABL) is in the floodplain of the North Branch Potomac River where the river has cut into the base of Knobly Mountain. Of the 12 past or present IRP sites at ABL, 9 are located within the developed area of Plant 1 and 3 are within the undeveloped area.
- Plant 2, which occupies the remaining 57 acres, is both owned and operated by ATK. Plant 2 is not included on the NPL.

ABL is located in the Valley and Ridge Physiographic Province near its western boundary with the Allegheny Plateau province and is underlain by sedimentary rocks folded and faulted during the Paleozoic Era. The most significant physiographic feature in the vicinity of ABL is Knobly Mountain, which flanks Plant 1 to the south and east. Knobly Mountain is the surface expression of a portion of the Wills Mountain anticlinorium, the anticlinal axis of which trends approximately N30°E and plunges to the southwest. This anticlinal axis is believed to bisect Plant 1.

Groundwater flow across Plant 1 in the alluvial and shallow bedrock aquifers generally is toward the North Branch Potomac River with no identifiable confining unit separating the two aquifers. The land surrounding the ABL facility is primarily rural agricultural, with some forestry. Residents across the North Branch Potomac River in Maryland use bedrock groundwater as a potable water source. Hydraulic data collected to date indicate that the North Branch Potomac River is a hydraulic divide for both alluvial and bedrock groundwater. Alluvial and bedrock groundwater at ABL is believed to discharge to the river, rather than pass beneath. In the residential area across from ABL, groundwater flow is south toward the river and ABL. The North Branch Potomac River is not used as a potable water supply in the vicinity of ABL, but may be used for recreational activities such as boating, fishing, and swimming.

1.2.2 Facility History and Current Activities

ABL was constructed in 1942 by the Kelly Springfield Engineering Company for the U.S. Army. At that time, the facility was used as a loading plant for 50-caliber machine gun ammunition for the U.S. Army. In 1943, George Washington University assumed management of the facility to conduct research and development of ballistic devices, primarily solid propellant for bazooka ammunition, until 1945. The Navy took ownership of the 400-acre Plant 1 portion of the facility in 1945 and the Aerospace Division of Hercules assumed management of the facility. In 1962, the Navy acquired an additional 1,177 acres of undeveloped land adjacent to Plant 1. In 1964, Hercules signed a Facilities Use Contract and began operating ABL under its own direction. In 1995, Alliant Techsystems, Inc. acquired the Aerospace division of Hercules and assumed operation of ABL.

Since 1943, the facility has been used primarily for the research, development, production, and testing of solid propellants and motors for ammunition, rockets, and armaments. Currently, the facility is operated as a highly automated production facility for tactical propulsion systems and composite and metal structures. ABL is a leading producer of tactical rocket motors, gas generators, and conventional warheads for the Department of Defense (DoD). The rocket motors produced vary in size and configuration, allowing for a wide range of

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applications including: air-to-air, air-to-surface, surface-to-surface, and surface-to-air missions. Work in other fields, including hazards analysis and risk control, gun control, and gun propellant testing, also is ongoing at ABL.

1.3 Environmental History

In the 1980s, DoD began identifying potential Naval facilities under the Navy Assessment and Control of Installation Pollutants Program (NACIP) (now referred to as the IRP). DoD tasked the Naval Energy and Environmental Support Activity (NEESA) (now referred to as the Naval Facilities Engineering Service Center [NFESC]) with producing preliminary site assessment reports for Naval facilities throughout the United States. After the reports were issued, CERCLA responsibilities under the IRP were transferred to the Naval Facilities Engineering Command (NAVFAC).

1.3.1 National Priorities List

The Plant 1 portion of ABL was proposed by USEPA for inclusion on the NPL in June 1993. The NPL, which was established by CERCLA, is the USEPA's list of the highest-priority hazardous waste sites in the nation. The decision to list a particular site is determined on the basis of calculated risks to human health and the environment. The Plant 1 portion of ABL was added to the NPL at *Federal Register*, Volume 59, Number 27989, on May 31, 1994.

CERCLA is often referred to as "Superfund" because it established a fund for cleaning up abandoned or uncontrolled hazardous waste sites. However, all activities at federal facilities listed on the NPL are funded by the responsible federal agency. In the case of the ABL site, the Navy funds the investigation and remedial activities. To fund these activities at military installations, DoD set up the Defense Environmental Restoration Account (DERA). The Navy's portion of that funding mechanism is known as the Environmental Restoration Navy (ERN) account which NAVFAC uses to fund CERCLA activities at ABL. Non-ERN funds, such as those available directly through the facility owner (i.e., NAVSEA), may also be used to fund various environmental activities. Although the responsibility for funding and carrying out environmental restoration at ABL rests with the Navy, the NPL listing gives USEPA a specific role in the oversight of these actions.

In addition, because ABL is on the NPL, the Navy and USEPA approve all Records of Decision (RODs) with West Virginia's concurrence. Therefore, prior to closing out a particular site, a no further action (NFA) ROD(s) must be signed to formally document site close-out through the CERCLA process.

1.3.2 Installation Restoration Program

In 1975, the DoD began a program to assess past hazardous and toxic materials storage and disposal activities at military installations. The goals of this program, now known as the Installation Restoration Program (IRP), were to identify environmental contamination resulting from past hazardous materials management practices, to assess the impacts of the contamination on public health and the environment, and to provide corrective measures as required to mitigate adverse impacts to the public and the environment.

In 1976, the Resource Conservation and Recovery Act (RCRA) was passed by Congress to address potentially adverse human health and environmental impacts of hazardous waste management and disposal practices. RCRA was legislated to manage the present and future disposal of hazardous wastes. In 1980, CERCLA, or "Superfund," was passed to investigate and remediate areas resulting from past hazardous waste management practices. This program is administered by USEPA or state agencies.

In 1981, the DOD's IRP was reauthorized with additional responsibilities and authorities specified in CERCLA delegated to the Secretary of Defense. The Navy subsequently restructured the IRP to match the terminology and structure of the CERCLA Program. The current IRP is consistent with CERCLA and applicable state environmental laws.

The environmental condition of ABL is being investigated through the DoD's IRP, which is being conducted in accordance with the applicable federal and state environmental regulations and requirements.

1.3.3 Federal Facility Agreement

Following ABL's listing on the NPL, negotiations on a FFA between USEPA, the State of West Virginia, and the Department of Navy was initiated. Under the "Federal Facilities" section of the NPL, federal agencies are considered responsible for conducting most of the response actions at facilities under their jurisdiction. The FFA between USEPA Region III, WVDEP, and the Navy was finalized in January 1998.

Under the terms and conditions of the FFA, Site Screening Areas (SSAs) are required to be investigated and, if appropriate, remediated in accordance with the NCP, CERCLA, Superfund Amendments and Reauthorization Act (SARA), and RCRA. These areas are designated in Appendix A of the FFA. Units that require additional documentation or sampling before a decision is made for no further action or inclusion as an SSA are classified as Areas of Concern (AOCs), or Appendix B units, in the FFA.

Section VIII paragraph 8.1 of the FFA describes integration the Navy's obligations under CERCLA and RCRA as stated below:

"The Parties intend to integrate the Navy's CERCLA response obligations and RCRA corrective action obligations which relate to the release(s) of hazardous substances, hazardous wastes, pollutants or contaminants covered by this Agreement into this comprehensive Agreement. Therefore, the Parties intend that activities covered by this Agreement will achieve compliance with CERCLA, 42 U.S.C. Section 9601 et seq.; satisfy the corrective action requirements of RCRA Sections 3004(u) and (v), 42 U.S.C. Sections 6924(u) and (v), for a RCRA permit, and RCRA Section 3008(h), 42 U.S.C. Section 6928(h), for interim status facilities; and meet or exceed all applicable or relevant and appropriate Federal and State laws and regulations, to the extent required by CERCLA Section 121, 42 U.S.C. Section 9621, and applicable State law."

The USEPA, WVDEP, and the Navy recognize that the requirement to obtain permits for response actions undertaken pursuant to the FFA shall be as provided for in CERCLA and the NCP and that ongoing hazardous waste management activities at ABL may still require the issuance of permits under Federal and State laws. This Agreement does not affect the requirements, if any, to obtain such permits.

Eight IRP sites are referenced in the FFA findings of fact for further investigation under CERCLA (i.e., Sites 1, 2, 3, 4B, 5, 7, PWA [Site 10], and 11). Six additional sites have been identified but are not included in the FFA (i.e., Sites 4A, 6, 8, 9, 12, and 13). SWMU 27A Range Road Area was identified as Site 13 Operable Unit 15 (OU-15) in 2008. **Table 1-1** summarizes further investigation IRP Sites, SWMUs, and AOCs that have been identified at ABL. Additional areas agreed to by the USEPA, WVDEP, and the Navy can be added to either Appendix A or B of the FFA at any time.

1.3.4 Previous Investigations

This subsection briefly describes environmental investigations conducted at ABL. Section 2 of this SMP describes how these investigations relate to the individual sites and units listed below. The approximate location of each IRP site that is under investigation or remediation is shown in **Figure 1-3**. As shown in the figure, seven of the sites are located within the 400-acre developed area of Plant 1 (i.e., sites 1, 2, 3, 4B, 10, 11, 12, and 13). Sites 5 and 7 are located in the largely undeveloped area to the south.

1.3.4.1. General Investigations at Installation Restoration Program Sites

An Initial Assessment Study (IAS) was performed at ABL in 1983 under the NACIP to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials handling and operations (NACIP, 1983). Nine potentially contaminated sites were identified at ABL, based upon information obtained from historical records, photographs, site inspections, and personnel interviews, during the IAS.

These nine sites are:

- Site 1: Northern Riverside Waste Disposal Area (includes SWMUs 1, 6, 7, 8, 11, 20, 22C and 22D)
- Site 2: Previous Burning Ground (1942-1949) (includes SWMU 4)
- Site 3: Previous Burning Ground (1950-1958) (includes SWMU 5)

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- Site 4: Spent Photographic Developing Solutions Disposal Sites
 - Site 4A: Spent X-Ray Developing Solution Disposal Site (includes SWMU 19)
 - Site 4B: Spent Photographic Developing Solution Disposal Site (includes SWMU 18)
- Site 5: Inert (Non-Ordnance) Landfill (includes SWMU 5)
- Site 6: Sensitivity Test Area/Surface Water Impoundment
- Site 7: Beryllium Landfill (includes SWMU 10)
- Site 8: Explosives Wastewater Sumps/Catch Basins
- Site 9: Former Acid Disposal Pit

Four sites have been added to the IRP at ABL since the IAS. These are:

- Site 10: Former TCE Still at Building 157 (includes Site PWA)
- Site 11: Production Well "F" (uncovered and identified during building demolition activities in November 1994 and includes SWMU 36)
- Site 12: Building 167 SWMUs, formerly AOC N (groundwater VOC plume discovered during Phase III SWMU/AOC Investigation)
- Site 13: OU 15 Range Road Area

The approximate location of each IRP site that is still under investigation or remediation is shown in **Figure 1-3**. As shown in the figure, seven of the sites are located within the 400-acre developed area of Plant 1 (i.e., sites 1, 2, 3, 4B, 10, 11, 12, and 13). Sites 5 and 7 are located in the largely undeveloped area to the south.

Each of the nine sites identified during the IAS was evaluated for the appropriate contaminant of concern, migration pathways, and pollution receptors. The IAS concluded that six of the nine sites (sites 1 through 6) posed significant potential threat to human health or the environment and warranted further evaluation in a confirmation study. Sampling and analysis was not performed as part of the IAS.

A Confirmation Study (CS) was initiated in June 1984 and completed in August 1987. The purpose of the CS was to confirm or refute the existence of the suspected contamination at sites 1 through 7 identified during the IAS, along with Plant Production Wells in the developed portion of Plant 1 (specifically PWA and PWC, which are now part of Site 10); springs; and the North Branch Potomac River. The results of the CS, documented in the Interim Remedial Investigation (Interim RI) Report (Weston, 1989), were used to recommend further investigation at seven sites (i.e., sites 1, 2, 3, 5, 7, and minimal activity at Site 4 [4A and 4B]) and Site PWA. The Interim RI Report recommended that activities be discontinued at Site 6.

Based upon the results and recommendations of the CS, a Remedial Investigation (RI), initiated in May 1992 and completed in October 1992, was conducted to further define the nature and extent of contamination at a number of ABL sites. The RI Report recommended further investigation at sites 1, 2, 3, 5 and PWA (CH2M HILL, January 1996). Because Site 1 was the largest and most complex site at ABL, with the highest concentrations and widest variety of constituents detected in soil, groundwater, surface water, and sediment samples, a separate focused Remedial Investigation/Feasibility Study (RI/FS) was recommended at the site to expedite the evaluation process. The remaining four sites were recommended for further investigation in a Phase II Remedial Investigation (Phase II RI).

In 1993, the USEPA conducted a Preliminary Review (PR) at ABL which involved a review of all relevant USEPA Region III files, including RCRA, CERCLA, Toxic Substance Control Act (TSCA), air, and water files. Additionally, a Visual Site Inspection (VSI) was conducted at the facility from February 2 through February 4, 1993. The results of the PR and VSI were documented in the *Phase II RCRA Facility Assessment for Allegany Ballistics Laboratory* (RFA) (USEPA, August 1993). Based upon the results of the RFA, it was recommended that further action be taken at 49 SWMUs and 12 AOCs. After performing a site visit to the SWMUs and AOCs identified during the RFA, the USEPA, Region III and WVDEP identified an additional 31 SWMUs and AOCs for a total of 92 units, where further evaluation was recommended.

In 1994, a Phase II RI was conducted to further define the nature and extent of contamination at sites 2, 3, 4, 5, and PWA. During this investigation, baseline human health and ecological risk assessments were performed to evaluate the risk posed by each site. The results of the Phase II RI concluded that remedial action alternatives should be evaluated for TCE contaminated soil at Site 3 near Building 151, the solvent storage shed; contaminated soils at Site 4B; contaminated soil and groundwater at the former TCE still area at Site PWA; and the landfill contents and contaminated groundwater at Site 5.

A background study was performed in 2003 to establish background concentrations for soil inorganics at ABL. These background concentrations are being utilized in ongoing human health and ecological risk assessments and in developing soil PRGs for several sites at the facility.

A planning document for use by the facility and the Navy entitled *The Final Construction, Excavation and Groundwater Use Restriction Plan for Installation Restoration Program Sites, Allegany Ballistics Laboratory, Rocket Center, West Virginia* was developed as a environmental planning tool for CERCLA sites currently under investigation or with a remedy in place requiring land use controls to prevent receptor exposure hazards. For sites with a final ROD, this document will be used as a guide to communicate land use controls (LUCs) the interim as a protectiveness measure until the Land Use Control Remedial Design is finalized. Sites with LUCs in place are shown on Figure 1-4.

1.3.5 Site Specific Investigations and Remediation Activities

Attachment A of this SMP provides a comprehensive list of all Sites, SWMUs, and AOCs at Plant 1documented in the FFA (and later added), their status, and anticipated additional activities, where appropriate. Six sites and 4 SWMUs/AOCs are currently under investigation at ABL and their current status is provided on Table 1-1. The sites, SWMUs, and AOCs currently under investigation consist of Site 1soil, Site 11 groundwater, Site 12 groundwater, Site 13 groundwater, sediment, and surface water. The remedies for these sites will be documented in a ROD. Site 1 groundwater, surface water, and sediment, Sites 5, and Site 10 have a ROD and remedy in place. Response is complete for Sites 2, 3, 4, 6, 7, and 9 through a No Further Action ROD. To date, 88 of the 92 SWMUs and AOCs identified at ABL during the 1993 RFA and further evaluations have been investigated and/or remediated and closed out with No Further Action. SWMU 37E and W groundwater are currently under investigation as part of Building 8 Lab Row. AOC M will be evaluated in future investigations.

1.3.5.1. Site 1

A Focused Remedial Investigation (Focused RI) was conducted in 1994 to fill data gaps that remained at Site 1 after the completion of the RI and to evaluate risk to human health and the environment from Site 1 media (CH2M HILL, August 1995). The results of the Focused RI for Site 1 indicated that volatile organic compounds (VOCs) were the most widespread contaminants detected in Site 1 media, with trichloroethene (TCE) detected most often and at the highest concentrations in soil and groundwater. The Focused RI indicated specific areas and media at Site 1 where remedial action alternatives should be evaluated in a Focused Feasibility Study (FFS). These included areas of contaminated soil around the solvent disposal pits, north of the east and west ends of the Burning Ground along the river, in the open and inert burn area landfills; contaminated groundwater in both the alluvial and bedrock aquifers; and contaminated surface water and sediment in the North Branch Potomac River, adjacent to Site 1.

In November and December 1994, a residential well sampling event was conducted to determine if constituents of concern detected at ABL had affected the groundwater potentially utilized by residents on the opposite side of the North Branch Potomac River from ABL. Groundwater samples were collected from eight wells at seven residences located along McKenzie Tower Road, directly across the river from Site 1. The Residential Well Sampling Report concluded that it was unlikely residential well water had been affected by groundwater contamination at ABL because VOCs (the primary constituents of concern in groundwater at ABL) were not detected in the residential well samples (CH2M HILL, March 1995).

Based upon the findings of the Site 1 Focused RI, a draft FFS was prepared to develop remedial action alternatives for all Site 1 media (CH2M HILL, October 1995). Due to the size and complexity of the site, the site was subdivided

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into operable units (OUs) for remedial action. Therefore, the draft FFS was never finalized. Instead, a final Site 1 FFS for groundwater, surface water, and sediment (OU3) was prepared to expedite remedial action for these media (CH2M HILL, September 1996). The selected remedy for Site 1 groundwater and the surface water and sediment of the North Branch Potomac River was site-wide groundwater containment and extraction with subsequent onsite treatment and discharge of treated water to the river. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for OU3 is functioning as intended by the ROD.

Using soil data gathered during the Focused RI and previous investigations, a subsequent soil sampling effort was conducted in October 1998 to fill existing data gaps and better delineate areas potentially requiring soil remediation at Site 1. While evaluating available data for human health and ecological risk assessment additional data gaps were identified. Therefore, a supplemental investigation was conducted for the surface and subsurface soil at Site 1 in October 2001 and September 2004. A Focused Remedial Investigation Report for Site 1 Soil was completed in July 2006 (CH2M HILL, July 2006).

In the Spring of 2008, a test pitting was conducted along the river front at Site 1 in an attempt to better quantify the extent of debris buried in the soil. The results showed that the bulk of the surface and subsurface debris is buried in the western and eastern region of the OABG area. The central region showed no surface or subsurface debris based upon the visual observations and test pits completed in this region. In addition, the results showed a general correlation between elevated COC levels and areas where debris was observed in the subsurface. . A draft feasibility study (FS) has been completed for Site 1 soil to evaluate remedial alternatives for long-term protection of human health and the environment, including protection against contaminants leaching to groundwater. Currently, the most favorable alternative identified in the FS is a RCRA Equivalent Subtitle C Cap and institutional controls (CH2MHILL, 2010). Additionally, a draft Engineering Evaluation and Cost Analysis (EE/CA) has been prepared to address unsaturated soil in the former disposal pits and is intended to supplement the selected remedy for Site 1 soil (CH2M HILL, 2011). This interim action is also intended to augment the existing groundwater treatment system, by reducing potential VOC source mass to prevent future leaching to groundwater. The Draft FS and Draft EE/CA are currently in regulatory review.

1.3.5.2. Site 2

A supplemental groundwater investigation was completed at Site 2 in 2004 to evaluate the potential for additional source areas upgradient of the site. The soil and groundwater data from these investigations were used to revise the human health and ecological risk assessments for sites 2 and 3 and a Risk Assessment Report was produced (CH2M HILL, July 2005). Two additional alluvial groundwater monitoring wells were installed at Site 2 in 2008. These new wells and the existing alluvial monitoring wells were sampled in order to confirm the arsenic concentrations in alluvial groundwater at Site 2 and to determine whether the arsenic concentrations in the alluvial groundwater could be attributable to historic releases at Site 2. Arsenic was not detected and a ROD requiring No Further Action (NFA) for Site 2 was issued in July 2008.

1.3.5.3. Site 3

A supplemental groundwater investigation was completed at Site 2 in 2004 to evaluate the potential for additional source areas upgradient of the site. The soil and groundwater data from these investigations were used to revise the human health and ecological risk assessments for sites 2 and 3 and a Risk Assessment Report was produced (CH2M HILL, July 2005). A No Further Action (NFA) ROD was signed for Site 3 in July 2007.

1.3.5.4. Site 4

A pilot study was initiated at Site 4B in October 2003. The principal object of the pilot study is to demonstrate the usefulness of XRF technology to provide real-time soil metals concentrations relative to established PRGs at Site 4B. The data from this investigation are presented in a Pilot Study Report (CH2M HILL, March 2006). A No Further Action (NFA) ROD was signed for Site 4B in November 2007.

Piping schematics and design drawings of Building 231 were inspected and analytical data were reviewed for Site 4A, the Spent X-Ray Developing Solution Disposal Site (referred to as SWMU 19 in the FFA) as part of the final RFA

report. The evaluation did not indicate that solutions would have been discharged to the ground and no contaminants were detected in composite soil samples so no further action was recommended for this unit. The site was closed out in the FFA under Findings of Fact Page 19.

1.3.5.5. Site 5

Based upon the results of the RI and Phase II RI activities at Site 5, an FFS for Site 5 Landfill Contents and Surface Soil was prepared (CH2M HILL, August 1996). In addition, an FFS for Site 5 Groundwater was drafted to develop and evaluate alternatives to address risk associated with Site 5 groundwater; however, this document was never submitted because the regulatory agencies requested that groundwater data be evaluated for 5 years following implementation of the landfill cap. Additional evaluation of groundwater, surface water, and sediment at Site 5 was conducted between 2000 and 2003. A Focused RI/FS was completed in 2004 (CH2M HILL, September 2004). A ROD for Site 5 groundwater, surface water, and sediment was signed in February 2006. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedies for the landfill contents and surface soil (OU1) and groundwater, surface water, and sediment (OU2) are functioning as intended by the ROD.

1.3.5.6. Site 6

In order to evaluate the presence of potential constituents of concern at Site 6, sediment samples were collected in 2001. The data from these samples were evaluated and it was determined that site conditions are protective of human health and the environment. Because Site 6 was not recommended for further investigation in the FFA, the sampling results, risk evaluation, and site closure was documented in a no further action closeout document in February 2002.

1.3.5.7. Site 7

The Interim RI and the RI found low levels of inorganic constituents in soil and groundwater at Site 7. Following a soil removal action, a Streamlined RI/FS report was prepared for Site 7 (CH2M HILL, April 2001). A No Further Action (NFA) ROD was signed for Site 7 in September 2001.

1.3.5.8. Site 8

Site 8, the Explosive Wastewater Sumps/Catch Basins, is comprised of SWMUs 37E, 37F, 37I, 37I, 37K, 37L, and 37M. Human health and ecological risks have been evaluated for these SWMUs, and with the exception of groundwater at SWMU 37E, have been formally closed as documented in closeout reports approved by WVDEP and USEPA between 1999 and 2002. Additional groundwater investigations are being completed at SWMU 37E (the Building 15 Wastewater Sump) to evaluate the presence of explosives, including HMX and RDX, in shallow groundwater.

1.3.5.9. Site 9

As stated in the FFA, the final RFA report issued in August 1993 reviewed existing data for Site 9, the Former Acid Disposal Pit (referred to as AOC F in the RFA), and recommended no further action for this unit. This site was closed out in the FFA under Findings of Fact Page 19.

1.3.5.10. Site 10

To remain consistent with the designation of sites at ABL, Site PWA was renamed Site 10 in 1995. In order to evaluate the hydraulic properties of the alluvial and bedrock aquifers at sites 1 and 10 and to determine the optimal number, configuration, and withdrawal rates of extraction wells, Phase I Aquifer Testing and Phase II Aquifer Testing at Site 1 and Site 10 were conducted in 1995 and 1996, respectively (CH2M HILL, December 1998, September 1999a, and September 1999b).

Based on the conclusions and recommendations of the Phase II RI and Phase I Aquifer Testing, a draft FFS was prepared to develop remedial action alternatives for Site 10 soil and groundwater. In order to expedite containment of the groundwater contamination plume, the site was subdivided into operable units (OUs) for remedial action. Therefore, the draft FFS was never finalized. Instead, a final Site 10 FFS for groundwater (OU5)

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was prepared to implement an interim remedial action (CH2M HILL, March 1998). The selected interim remedy for Site 10 groundwater was "hot-spot" groundwater extraction with subsequent onsite treatment and discharge of treated water to the river.

Additional soil sampling was performed at Site 10 in June 2000 to further delineate the extent of soil contamination associated with the former TCE still and supplement existing data. The results of supplemental sampling were incorporated into a Risk Assessment Report (CH2M HILL, July 2005). A No Further Action (NFA) ROD was signed for Site 10 Soil in July 2007.

Phase III Aquifer Testing was conducted in 2001, in part to evaluate the hydraulic interconnection between Site 1 and Site 10 and the likelihood of being able to hydraulically contain the groundwater contaminant plume at Site 10 containing VOC concentrations above MCLs. Based on the results of the Phase III Aquifer Testing activities, it was determined that the addition of a fourth alluvial extraction well and four bedrock extraction wells to the existing Site 10 extraction well alignment would likely meet the containment objectives in both the alluvial and bedrock aquifers. These changes to the extraction system were proposed as the final remedial alternative for Site 10 groundwater in a November 2001 PRAP. Construction of the Site 10 groundwater extraction system modification and the installation of four additional monitoring wells (three bedrock and one alluvial) was completed and the modified system activated in February 2003. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for Site 10 (OU5) is functioning as intended by the ROD.

1.3.5.11. Site 11

Previous Investigations at Site 11 In 1995, an Advanced Site Inspection (ASI) was conducted to characterize potential groundwater and soil contamination in and around Production Well F (F-Well) and a former oil pit at the construction site for Building 421, the existing building adjacent to F-Well. The ASI identified a limited area of soil contamination and a broader area of groundwater contamination in the alluvial and bedrock aquifers. Furthermore, a light non-aqueous-phase liquid (LNAPL) and a dense non-aqueous-phase liquid (DNAPL) were detected in F-Well. Prior to the ASI, the facility removed the former oil pit and any visibly contaminated soil.

Based on the findings of the ASI, an RI was initiated at Site 11 in June 1998 to delineate the nature and extent of contamination in the soil and alluvial and bedrock aquifers in the vicinity of F-Well. The groundwater monitoring phase of the RI was extended to include quarterly groundwater sampling for 1 year. An RI Report was completed in January 2005 that included human health and ecological risk assessments for Site 11 (CH2M HILL, January 2005). A Feasibility Study for the combined areas of Site 11 and Site 12 was completed in 2010. The PRAP was finalized in March 2011 and identifies the preferred remedial alternative for Site 11 as, source zone removal (already complete), focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls. The ROD for Site 11 is scheduled for FY2011.

1.3.5.12. Site 12

During Phase III SWMU/AOC Investigation activities at AOC N, VOC contamination was discovered in the alluvial aquifer in the vicinity of Building 167 and below and adjacent to the former SWMU 37N wastewater sump. Because of the relatively large area and high levels of contamination, AOC N was designated IR Site 12. A draft Remedial Investigation report for Site 12 was submitted in February 2008. A Feasibility Study for the combined areas of Site 11 and Site 12 was completed in 2010. The PRAP was finalized in March 2011, which identifies the preferred remedial alternative for Site 12 as, source zone removal (already complete), focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls. The ROD is scheduled in FY2011.

1.3.5.13. Site 13

The Phase III Investigation for Site 13 (Formerly known as SWMU 27A) in part sought to identify the source of TCE which had been sporadically detected in various outfalls during the NPDES monitoring program (CH2M HILL, 2005). In the sediment sampling conducted during the Phase III Investigation, TCE was detected in one of the samples collected from the drainage ditch downstream of Site 13, monitored as part of the facility's National Pollutant Discharge Elimination System (NPDES) program, resulting in the collection and analysis for VOCs of

additional surface water samples from the main drainage channel and its tributaries upstream of the sampling location. TCE was consistently detected (at concentrations between 11 μ g/L and 140 μ g/L in surface water samples. Because TCE is no longer used at the facility, contaminated groundwater near the Range Road intersection was believed to be the source of TCE in the drainage ditch. Groundwater samples were collected in 2002 and 2003 to identify the TCE source and better define the extent of VOCs in alluvial groundwater. These grab samples identified an elongated area of dissolved TCE in groundwater, trending to the east-northeast and roughly parallel to the Plant 1 drainage system near the Range Road—H Street intersection. Though there are no known potential sources of TCE at SWMU 27A, a search of historical information conducted during the Phase III Investigation revealed that there was a boiler (Building 106A) northeast of the Range Road and H Street intersection where degreasing operations dating to 1952 were conducted. No potential source of TCE southwest of the intersection was identified. TCE migration along the facility sewer lines from other IRP sites was ruled out because there are no sewer lines located in the immediate vicinity of the intersection.

Additional soil and groundwater studies were conducted as part of Phase IV investigations (CH2M HILL, 2004) which focused on the potential source area of TCE in the vicinity of the former boiler. An initial pilot study was conducted to evaluate the effectiveness of an in situ injection in alluvial groundwater to enhance aerobic degradation of VOCs (CH2M HILL, 2008b). Groundwater analytical results of the pilot study and follow-up sampling events showed that TCE concentrations were significantly reduced, and TCE anaerobic breakdown products increased in the pilot study area (CH2M HILL, 2008). A similar pattern of reduction in TCE concentrations was observed in SWMU 27A surface water downgradient of the pilot study area. Subsequent to identifying the area for pilot study, higher TCE concentrations were discovered in the area upgradient of the initial pilot study area.

Additional characterization activities were conducted in 2006 following the initial pilot study to delineate the higher concentrations of VOCs in the alluvial aquifer hydraulically upgradient and cross-gradient of the initial pilot study area (CH2M HILL, 2006). Results from the additional characterization activities indicated the highest groundwater concentrations of VOCs in the area between G Street, Range Road, H Street, and the Plant 1 drainage ditch as suggested by previous investigations. It was concluded that additional data would be needed to confirm that TCE in groundwater was adequately characterized.

Additional data were collected from the alluvial aquifer in February 2008 using multiple passive diffusion bag (PDB) samplers within select individual monitoring wells (CH2M HILL, 2008). These samples were collected to examine the vertical stratification of VOCs within the alluvial aquifer. The results of the PDB sampling did not identify significant vertical stratification of VOC concentrations.

Because no specific historical source or release event has been identified for VOCs at Site 13, a membrane interface probe (MIP) survey was performed to determine if there was a yet-undefined VOC source related to LNAPL or TPHs in the vadose zone near the highest concentrations of TCE in groundwater. The soil results of this investigation (CH2M HILL, 2008d), suggest that the vadose zone source of TCE in groundwater at Site 13 has either degraded or been leached from the soil.

A second pilot study at Site 13 was conducted in 2008 to evaluate the effectiveness of an in situ injection in alluvial groundwater to enhance reductive dechlorination of VOCs, including TCE, to concentrations approaching their respective MCLs. When compared to the results of the baseline sampling event conducted in August 2008, the reduction in TCE ranged between 80 and 99.9 percent (CH2M HILL 2009b).

An RI is currently being completed for Site 13 to assess the nature and extent of contamination (including vertical migration of VOCs within the bedrock), assess potential risks to human health and the environment.

1.3.5.14. Building 8/Lab Row Area

The RFA identified fifteen SWMUs within the Building 8/Lab Row Area. SWMUs 24F, 24H, 25A, and 30 within Building 8 and SWMUs 24I, 24K and 29A, were recommended for NFA in the RFA and were subsequently closed in 2002 with no action (CH2M HILL, 2002).

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The Phase I SWMU investigation was conducted to determine if releases had resulted from prior area activities at a number of SWMUs throughout the facility including six Building 8/ Lab Row Area SWMUs (24J, 37C, 37D, 37E, 37T, and 40). Direct push soil samples were collected from SWMUs 37C, 37D, 37E, 37T, and 40 for screening purposes. In addition, one wipe sample for polychlorinated biphenyls (PCBs) was collected from SWMU 24J. Sample results indicate no volatile organic compounds (VOC) or explosives were detected in the samples collected from SWMU 37D and 37T. Although explosives were detected at SWMU 37E, detected concentrations were below risk based criteria (RBC). Low levels of VOCs and/or explosives were detected at SWUM 37C. PCBs were not found to exceed Toxic Substance Control Act (TSCA) cleanup levels at SWMU 24J.

The Phase II SWMU investigation was conducted in 2005 to determine if releases had resulted from prior area activities at a number of SWMUs throughout the facility that had not been investigated during Phase II, including five Building 8/Lab Row Area SWMUs 37V and 37W. In addition, SWMUs 37C, 37E, 37T, and SWMU 40 were further investigated (CH2M HILL, 2005). Direct push groundwater samples were collected from SWMUs 37E, 37V, 37W; and monitoring wells were installed to investigate groundwater at SWMU 37C (GGW11 and GGW12), and SWMU 37T (GGW13). In addition, one groundwater sample was collected from 10GW08 because of its proximity to SWMU 37E.

A Phase III/IV investigation was conducted in 2005 to determine if releases of constituents from past practices at the SWMUs pose a potentially unacceptable risk to human health and the environment CH2M HILL, 2005b. During the Phase III/IV investigation, samples were collected from 37E and 37V to supplement data collected during Phase I and Phase II investigations. One monitoring well sample was collected from GGW-20 near 37E; both RDX and HMX were detected at 41 and 7.1 μ g/L, respectively. At SWMU 37V, soil, direct push groundwater, and monitoring well samples were collected. No constituent concentrations exceeded RBCs or MCLs.

Currently a PA/SI for groundwater at Building 8/Lab Row Area is being conducted. Results from the PA/SI will be used to determine if a Remedial Investigation is warranted.

TABLE 1-1
Further Investigation Sites, SWMUs, and AOCs
Allegany Ballistics Laboratory (ABL)

Site/AOC Number	Site Identification	Operable Unit Number	Operable Unit Description	ROD Signed (Yes/No)	CERCLA Process Status
1	Northern Riverside Waste Disposal Area	4	Soil	No	RI completed in July 2006. FS is planned for 2010.
11	Production Well "F"	11	Groundwater and Soil	No	FS was completed in 2010; PRAP finalized in March 2011 and ROD expected by end of FY11
12	Building 167 SWMUs (formerly AOC N)	8	Groundwater and Soil	No	FS was completed in 2010; PRAP finalized in March 2011 and ROD expected by end of FY11
13*	Range Road Area	15	Groundwater	No	RI field work is currently being conducted.
SWMU 37E	Building 15 Wastewater Sump	Арр В	Groundwater	No	Identified and described in the SMP as Building 8/Lab Row Area; Groundwater investigation currently being conducted
SWMU 37W	Building 8 Wastewater Sump	Арр В	Groundwater	No	Identified and described in the SMP as Building 8/Lab Row Area; Groundwater investigation currently being conducted
AOC M	Small Scattered Debris Areas	Арр В	Debris	No	Debris may be addressed during Site 1 remedial action

Abbreviations:

AOC = Area of Concern

FS = Feasibility Study

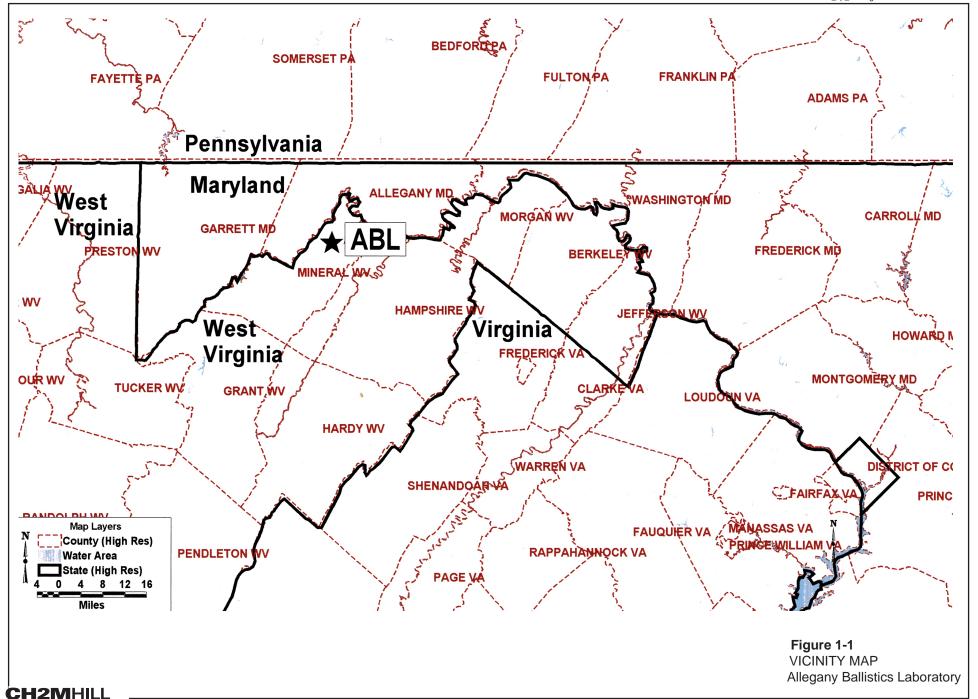
OU = Operable Unit

RI = Remedial Investigation

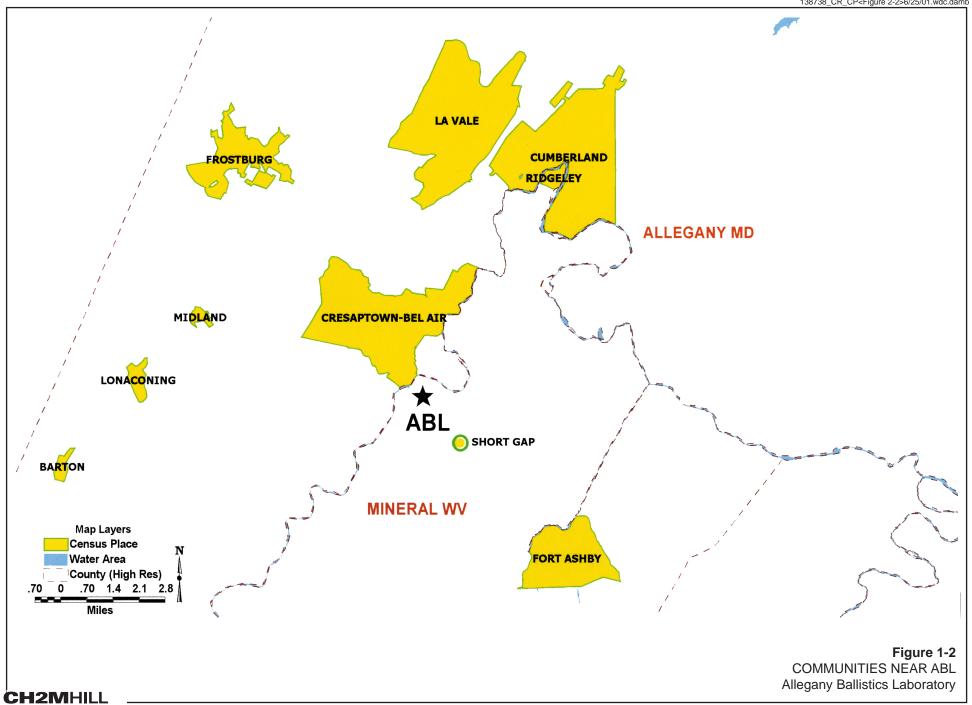
ROD = Record of Decision

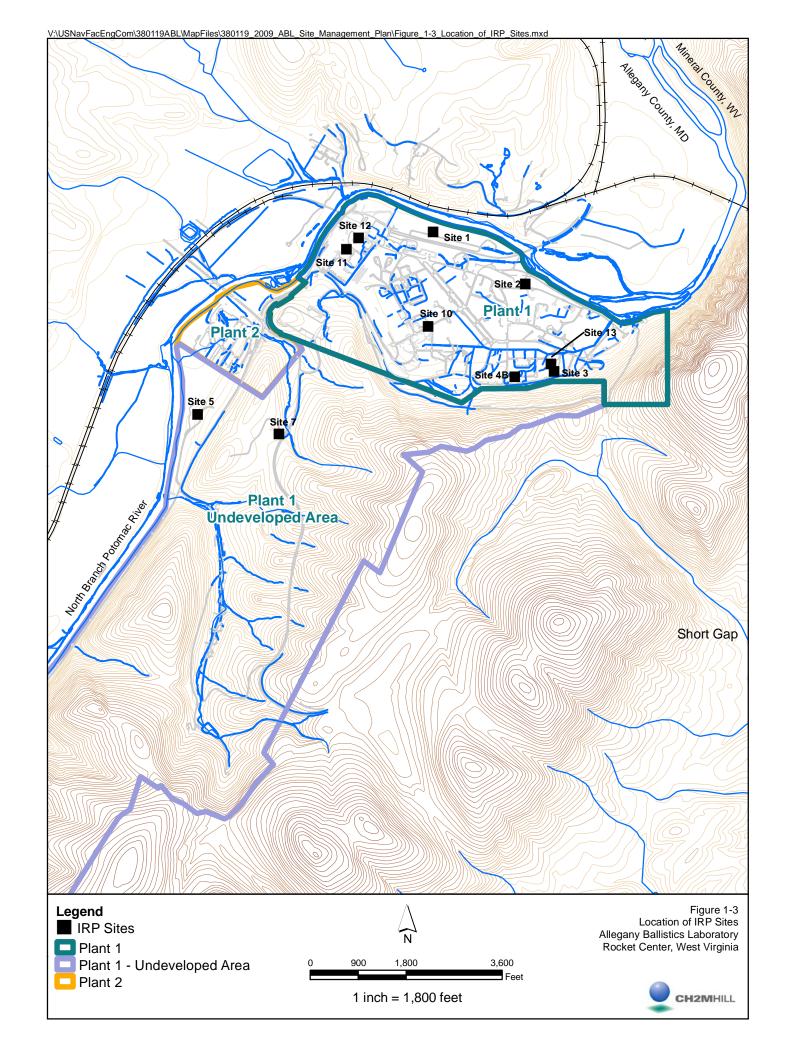
SWMU = Solid Waste Management Unit

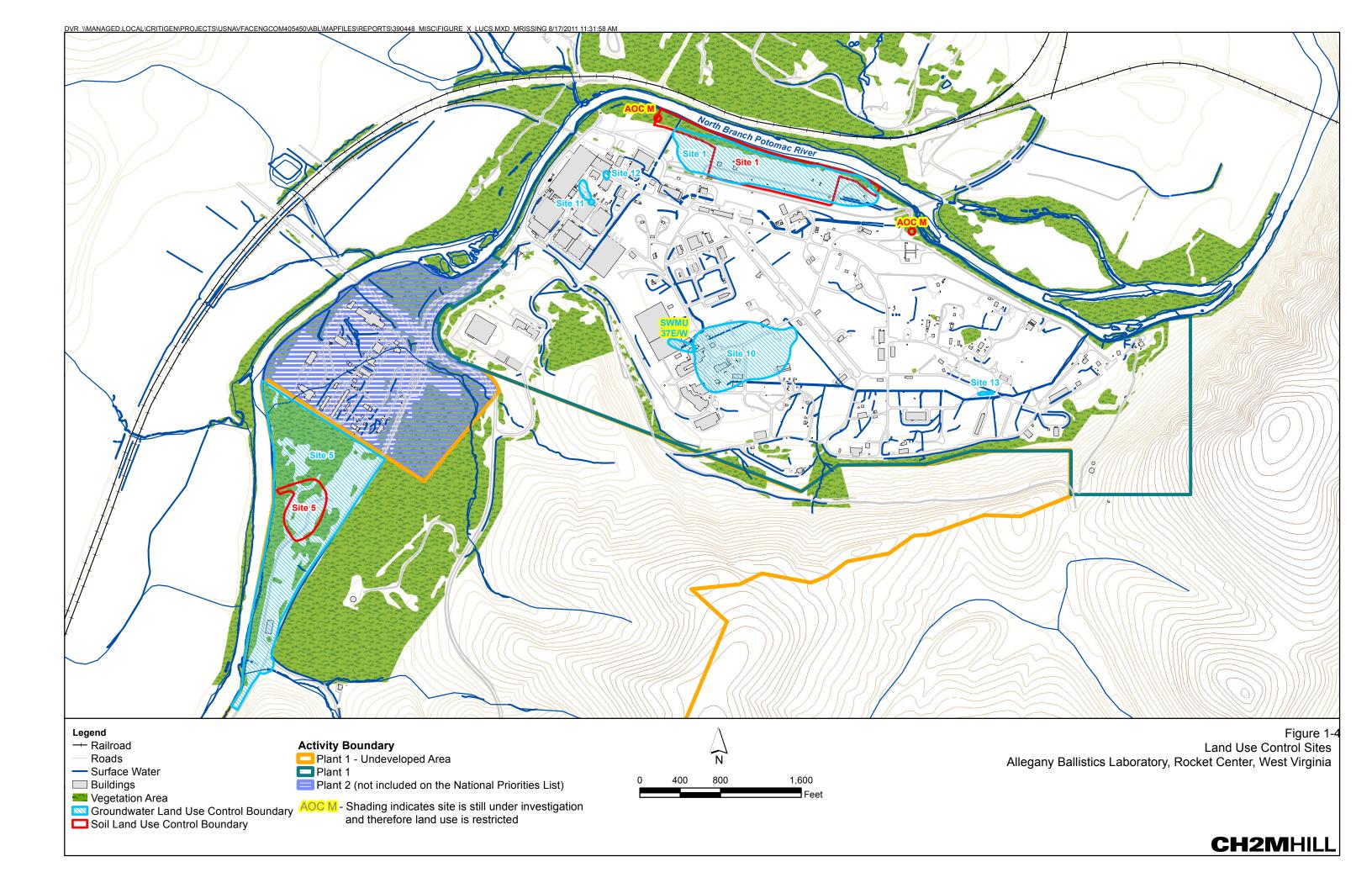
^{*} Indicates units not listed in the FFA for further investigation.



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Unit Descriptions and Tracking Matrix

This SMP is intended to cover all units (i.e., IRP sites, SSAs, and AOCs) listed in the FFA. The site-specific information provided in this section includes physical characteristics, a description of past activities conducted, and known contaminants by media. However, inactive units that are either closed through a consensus agreement or recommended for no further action are not included.

Because the various environmental investigative programs have used different unit nomenclature throughout the environmental history of the facility, summary tables have been prepared to act as a tracking aid for each unit. The tables include the designation of each unit (name), location, historical dates of operation (if known), a description of the wastes managed, and the current status of each unit. Attachment A summarizes this information for the IRP sites and SWMU/AOC units, respectively. Attachment B shows the locations of all monitoring wells at the ABL facility.

2.1 Installation Restoration Program Sites

The IRP sites currently in the CERCLA remedial process are described below. The following site descriptions include physical characteristics, past activities, detected constituents, and planned activities.

2.1.1 Site 1: Northern Riverside Waste Disposal Area

Site 1 is an 11-acre area that consists of several disposal units, including an active 8-acre, fenced burning ground for reactive wastes including propellants and explosive (P/E) wastes; three inactive disposal pits for spent solvents and acids; a former drum storage area for drums containing hazardous wastes; a former landfill for ash; and a former burning area for inert substances. The three disposal pits have been backfilled, all drums have been removed from the drum storage area, and both the ash landfill and the inert burning ground are overgrown with vegetation.

As noted in Section 1, Site 1 was part of a number of investigations conducted at ABL in the 1980s and early-1990s. Information gathered during the RI and Focused RI indicates that VOCs (specifically TCE, 1,2-DCE, 1,1,1-TCA, MC, and acetone) were the most widespread constituents of potential concern (COPCs) detected at Site 1 in soil, alluvial and bedrock groundwater, surface water, and sediment. Based upon risks identified for Site 1 media during the Focused RI, an FFS for Site 1 groundwater was completed in September 1996.

The Navy issued a PRAP for groundwater, surface water, and sediment in October 1996 and signed the ROD for interim remedial action in May 1997. The selected remedy for Site 1 groundwater and the surface water and sediment of the North Branch Potomac River adjacent to Site 1 was site-wide alluvial and bedrock groundwater containment (i.e., capture and removal) with subsequent onsite treatment and discharge of treated water to the river.

In order to evaluate the hydraulic properties of the alluvial and bedrock aquifers at Site 1 and to determine the optimal number, configuration, and withdrawal rates of extraction wells, Phase I Aquifer Testing, Phase II Aquifer Testing, and Phase III Aquifer Testing were conducted in 1995, 1996, and 2001, respectively.

Construction of a groundwater treatment facility to remove hazardous constituents from the extracted groundwater at Site 1 began in September 1997. The treatment plant began continuous operation in September 1998 and has treated an average of more than 100 gallons per minute (gpm) of groundwater extracted from Site 1 since that time. Currently, treated groundwater is utilized by the ABL boiler plant, with excess water being discharged to the river.

A pilot study was conducted in 2005 to evaluate the effectiveness of using in situ chemical oxidation to reduce contaminant mass in the alluvial and bedrock aquifers in the vicinity of the former solvent pits. The results of the study were presented in a draft report in 2006.

As described in Section 1, soil data at Site 1 were collected during the RI, Focused RI, and 1998, 2001, and 2004 supplemental soil sampling efforts to better delineate areas of contamination. An RI report for Site 1 soil was finalized in 2006, which includes revised human health and ecological risk assessments. A feasibility study (FS) is currently being prepared to address soil contamination at Site 1.

Site 1 consists of several areas, each with a unique history, as described below. These areas were originally defined based upon suspected areas of contamination and may be redefined based on the revised risk assessments and ARARs. Consequently, areas with similar health risks and contaminants may be addressed in the same EECA.

2.1.1.1. Former Open Burn Area

The Former Open Burn Area is located at the far northwestern end of Site 1 and includes the Open Burn Area Landfill, Former Burn Cages and Ash Landfill [SWMUs 11, 22C and 22D], the Open Burn Area Landfill Drainage Ditch, and the Former Hazardous Waste Storage Area [SWMU 1], as shown in Figure 2-1. The Open Burn Area Landfill Drainage Ditch is a man-made earthen drainage culvert that cuts through this area and is used to drain surface/storm water from Plant 1. Landfilled material and trash are visible in the cuts of this culvert and in the Open Burn Area Landfill.

2.1.1.2. Inert Burning Ground (SWMU 7)

The Former Inert Burning Ground and associated landfill are located on the far northeastern end of Site 1, as shown in Figure 2-2. The following text is extracted from the Phase II RCRA Facility Assessment; "Waste materials contaminated with explosives, including explosive contaminated waste rags, were burned at the Inert Burning Ground (SWMU 7) between 1958 and approximately 1985. These rags may also have been contaminated with solvents, including methylene chloride and TCE. This unit was located near the bank of the North Branch Potomac River outside the fenced area of the Current Burning Ground (SWMU 6) site. Ash from this unit was deposited at the site. Waste material profiles from the facility's contracted waste hauler indicate that current ash residues potentially contain aluminum oxide and residual solvents such as methylene chloride and 1,1,1-TCA. Paper and combustible containers were also burned at the unit. Historical waste profiles are not available" (USEPA, August 1993).

2.1.1.3. Eastern TCE "Hot Spot"

This area is adjacent to the eastern end of the fenced open burning grounds, between the fence line and the North Branch Potomac River, as shown in **Figure 2-3**. The site is in a wooded setting and is likely the result of isolated dumping or spilling.

2.1.1.4. Central TCE "Hot Spot"

This area is adjacent to the central portion of the fenced open burning grounds, between the fence line and the North Branch Potomac River, as shown in **Figure 2-4**. Again, the site is in a wooded setting and is likely the result of isolated dumping or spilling.

2.1.1.5. Western TCE "Hot Spot"

This area is a TCE hot spot within the debris landfill adjacent to the western end of the fenced open burning ground, between the fence line and the North Branch Potomac River, as shown in Figure 2-4. Partially buried drums, which are still present, are believed to be the source of the TCE hot spot.

2.1.1.6. Solvent Disposal Pit Area

This area consists of the former solvent disposal pit area (includes SWMUs 6, 8, and 20). This area is located approximately 250 feet from the river (see Figure 2-4) and is considered to be the primary source of groundwater VOC contamination at Site 1.

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2.1.1.7. Debris Area

The debris area is a portion of the debris landfill containing visible waste, but with significantly lower concentrations of detected VOCs than the western TCE hotspot. This area is located east of the Former Open Burn Area, as shown in Figure 2-1.

2.1.1.8. Perchlorate

Perchlorate has been detected in selected Site 1 groundwater monitoring wells, the effluent from the Site 1 Groundwater Treatment Plant and in runoff from the Plant 1 drainage ditch at sampling location SSL-2. Ammonium perchlorate is used as a primary component in solid propellant for rockets and missiles.

Perchlorate (ClO4⁻) is an anion that originates as a contaminant in groundwater and surface waters when the perchlorate salts of ammonium, potassium, magnesium, or sodium dissolve in water. The West Virginia and Maryland State governments as well as the Federal government have not established cleanup standards for perchlorate, as of this time. However, West Virginia established a discharge limit for perchlorate from the ABL Groundwater Treatment Plant on August 13, 2009, at CERCLA outfall 001. The compliance schedule developed to meet this requirement is presented in Section 4 of this SMP.

2.1.2 Site 2: Previous Burning Ground (1942-1949)

Site 2 was an open burning ground reportedly utilized from 1942 to 1949 in a manner similar to the Site 1 open burning ground. Based upon aerial photographs, the former burn pad area is suspected to be southeast of Building 361, as shown in Figure 2-5. In addition, a solvent storage shed was identified near Building 100 during the RI. Past sampling events at Site 2 have targeted both of these areas. The area adjacent to the solvent shed was subsequently identified as AOC Q and was closed in 2005. The amount of wastes disposed of at Site 2 cannot be determined due to the lack of historical records about past disposal practices.

As described in Section 1, several investigations (i.e., IAS, CS/Interim RI, RI, and Phase II RI) have been performed to evaluate the nature and extent of contamination in environmental media at Site 2. Generally, low estimated concentrations of only a few VOCs (i.e., TCE, 1,1-DCE, carbon disulfide, and xylenes) and SVOCs (mostly PAHs) were detected in the soil at Site 2. Several inorganic constituents (i.e., mercury, nickel, aluminum, arsenic, manganese, and silver) were identified as COPCs for Site 2 soil in the risk assessments conducted during the Phase II RI (CH2M HILL, August 1996). VOCs have been detected in groundwater up- and side- gradient (near AOC Q) and downgradient of Site 2. Groundwater sampling conducted during the Phase II RI and in January 2003 indicates that TCE concentrations in these wells are decreasing.

Previous data suggested that Site 2 does not pose a significant risk to human health or the environment. However, because data gaps were identified supplementary surface and subsurface soil sampling activities were conducted in October 2001 and supplementary groundwater investigations were completed in 2004. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that Site 2 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 2 that indicated that the preferred alternative for this site is no further action (NFA). However, during a review of the Site 2 ROD, USEPA raised a concern associated with exposure to arsenic in groundwater, primarily as the result of the arsenic concentration in the hybrid well (2GW01). Because of the unusual construction of 2GW01, which was installed across the alluvial/bedrock contact, it was abandoned and replaced with a new alluvial well. A second well was installed immediately adjacent to Site 2. The analytical results from the two new wells, together with the analytical results from resampling other existing alluvial wells, were then evaluated and incorporated into a revised human health risk assessment for groundwater at Site 2. It was found that groundwater does not pose an unacceptable risk to human health or the environment and an NFA ROD was issued in July 2008.

2.1.3 Site 3: Previous Burning Ground (1950-1958)

Similar to Site 2, Site 3 was an open burning ground reportedly utilized from 1950 to 1958. Two areas of disturbed soil and four linear features at the approximate location of current southern end of Building 362 were identified in aerial photographs. In addition, an attached solvent storage shed was identified on the west-end of

Building 151 during the RI. The area adjacent to the solvent shed was subsequently identified as AOC R and was closed in 2007. Past sampling events at Site 3 are shown in **Figure 2-6**. The quantities of wastes that were disposed of in this area cannot be determined due to a lack of historical records about past disposal practices.

As described in Section 1, several investigations (i.e., IAS, CS/Interim RI, RI, and Phase II RI) have been performed to evaluate the nature and extent of contamination in environmental media at Site 3. VOCs (i.e., TCE, MC, cis-1,2-DCE, 1,2-DCE [total], and acetone) were detected in the sample (i.e., HCS-S3-1) collected just south of the solvent storage shed at much higher concentrations than elsewhere at Site 3. Generally, low estimated concentrations of only a few VOCs were detected in all other samples collected at Site 3. Bis(2-ethylhexyl phthalate), a common laboratory contaminant, was the only SVOC detected in the soil at Site 3. No COPCs were identified for Site 3 surface soil. Two organic constituents (i.e., 1,2-DCE [total] and TCE) and three inorganic constituents (i.e., arsenic, barium, and manganese) were identified as COPCs for Site 3 media in the human health risk assessment conducted during the Phase II RI (CH2M HILL, August 1996). Existing data suggest Site 3 does not pose a significant risk to human health or the environment. However, like Site 2, data gaps were identified, so supplementary surface and subsurface soil sampling activities were conducted in October 2001 to revise the human health and ecological risk assessments for the site. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that Site 3 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 3 that indicated that the preferred alternative for this site is NFA. A NFA ROD was signed in 2007.

2.1.4 Site 4B: Spent Photographic Developing Solution Site

Site 4B, the Spent Photographic Developing Solution Site, is located in the southeastern portion of Plant 1, approximately 3,000 feet from the North Branch Potomac River. The site is composed of the area adjacent to the southeast corner of Building 181 where spent photographic solutions (containing silver, cyanide, and phenols) were reportedly discharged through a fire hose, into a concrete drainage channel, and then underground into a French drain that extends from the end of the concrete drainage channel to an open stormwater drainage ditch in an adjacent grassed area (Figure 2-7). Elevated concentrations of silver were detected in surface soil samples collected at Site 4B during the CS. Additional soil sampling was performed at the site during the Phase II RI where the concrete drainage channel enters the French drain and in the adjacent drainage ditch. Elevated levels of silver were again detected, in addition to low levels of several VOCs and SVOCs. The risk assessment performed using data gathered during the Phase II RI and previous investigations suggested that silver concentrations in soil may pose a risk to human health.

Additional soil sampling was conducted at Site 4B in June 2000 to evaluate the potential impacts to soil due to the discharge of spent photographic solutions from Building 181. These data were also used to determine if concentrations of silver (the primary COPC) or any other inorganic constituents at the site pose a risk to human health or the environment.

The results of the risk assessments were used to determine PRGs for soil contamination at Site 4B. A soil removal pilot study using X-ray fluorescence (XRF) technology was initiated in November 2003 for iron, manganese, silver, and thallium following the establishment of background inorganics concentrations for soil. Most of the impacted soil was removed during the first phase of the pilot study, however, some additional excavation and confirmatory sampling was conducted in 2004 and 2005. Results of the study are presented in the *Final Site 4B pilot Study Report* (CH2M HILL, March 2006). In 2007, a PRAP was prepared for Site 4B that indicated that the preferred alternative for this site is NFA. An NFA ROD was signed in November 2007.

2.1.5 Site 5: Inert (Non-Ordnance) Landfill

The Site 5 inert landfill operated from the early-1960s to 1985, accepting wastes generated by ABL and deemed to be inert. The landfill is located on a terrace above the North Branch Potomac River southwest of Plant 1 and south of Plant 2. Inert wastes were defined as wastes not contaminated with explosives nor generated at an area on the facility where explosives were managed. Wastes reported to have been disposed of at Site 5 include drums that previously contained TCE, methylene chloride, and acetone; fluorescent tubes (potential mercury

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source); unknown laboratory and photographic chemicals; fiberglass and other resin-coated fibers; metal and plastic machining wastes; and construction and demolition debris.

As described in Section 1, several investigations (i.e., IAS, RI, Phase II RI, and MNA Investigation) have been performed to evaluate the nature and extent of contamination in environmental media at Site 5 (see Figure 2-8). In general, low levels of VOCs, SVOCs, pesticides, and inorganics were detected in soil samples collected around the perimeter of the landfill. In addition, TCE concentrations up to approximately 100 μ g/I have been detected in Site 5 groundwater.

In October 1996, the Navy issued a PRAP for Landfill Contents and Soil for Site 5 and signed a ROD in February 1997. The accepted remedy was landfill capping and long-term monitoring of groundwater and storm water at the site and sediment adjacent to the site. A landfill cap was designed and constructed during the summer of 1997 and was completed in September 1997. A long-term monitoring program for groundwater was implemented in 1998 as part of the operations and maintenance of the landfill cap remedy.

In November 1999, the Navy implemented a monitored natural attenuation (MNA) study to evaluate its feasibility as a remedial alternative for Site 5 groundwater. A preliminary assessment was conducted using existing groundwater data from the long-term monitoring program, and based on this screening, an MNA assessment field investigation was conducted. The purpose of this MNA investigation was to delineate the TCE plume boundaries and to collect MNA indicator parameter data. During the investigation, six additional alluvial monitoring wells were installed, following TCE plume delineation using direct-push technology and onsite VOC screening analysis. A groundwater sampling event that included natural attenuation parameters was performed at Site 5 in July 2000 in conjunction with the scheduled long-term monitoring event.

The Site 5 human health and ecological risk assessments were revised for groundwater, surface water, and sediment, because a substantial amount of additional data were collected since the risk assessments were last prepared during the 1994 Phase II RI. The updated risk assessments and an evaluation of remedial alternatives for Site 5 groundwater are documented in the *Focused Remedial Investigation and Feasibility Study fir Site 5 Groundwater, Surface Water, and Sediment* (CH2M HILL, September, 2004). A ROD for Site 5 groundwater, surface water, and sediment was signed in February 2006. The remedy selected by the ROD includes installation of a permeable reactive barrier (PRB) wall filled with zero-valent iron to treat alluvial groundwater downgradient of the Site 5 landfill. This remedy was installed in June 2006. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedies for the landfill contents and surface soil (OU1) and groundwater, surface water, and sediment (OU2) are functioning as intended by the ROD.

2.1.6 Site 7: Former Beryllium Landfill

In the early 1960s, ABL requested and obtained a permit from the State of West Virginia (Permit 3324) to establish a landfill for beryllium waste disposal. ABL was conducting research on propellants containing beryllium and required disposal facilities for both beryllium-containing propellants and elemental beryllium. A small (10 feet by 15 feet by 6 feet deep) earthen pit was excavated to the limestone bedrock, which was used intermittently in the 1960s to dispose of beryllium and beryllium-contaminated waste. The former beryllium landfill is located outside of Plant 1, as shown in **Figure 1-3**. The research with beryllium at ABL ceased in the late 1960s.

- Records documenting the material disposed of at the landfill (Site 7) were not kept and identification of material disposed of was based on conversations with facility personnel who were present at the time the site was active. The following information was gathered from these personnel:
- Beryllium-containing wastes included wiping tissues, gloves, emptied containers, and respirator cartridges which might have been contaminated with metallic beryllium or beryllium oxide.
- The total quantity of waste disposed of in the landfill was considered "small" because the landfill was approximately 150 square feet and 6 feet deep. Waste was placed in the pit and covered with a few shovels of dirt.

• A small quantity of laboratory chemicals also was placed in the landfill; however, no personnel were able to provide information as to the specific chemicals or chemical types.

Site 7 was evaluated during a number of investigations. The Interim RI and the RI found only relatively low levels of inorganic constituents in soil and groundwater at the site. In June 1994, the material from Site 7 was excavated and placed into steel storage containers. The results from the Interim RI were used initially to characterize the waste as non-hazardous. The excavation and backfilling of the Site 7 landfill was completed on June 30, 1994. In 1997, the excavated soil was shipped offsite for disposal.

A Streamlined RI/FS report was prepared for Site 7 in 2001 to document the history of investigation and remedial action activities, the nature and extent of contamination, potential risks to human health and the environment from site media, and evaluate potential remedial alternatives for the site.

A No Further Action (NFA) ROD was signed for Site 7 in September 2001.

2.1.7 Site 10: Former TCE Still at Building 157

Site 10 consists of the area around Building 157 and is located within the developed portion of Plant 1, as shown in **Figure 2-9**. In order to be consistent with other numbered IRP sites at ABL, Site PWA was renamed Site 10 in 1995. Site PWA had been defined and investigated during the CS, RI, and Phase II RI because contamination had been detected in production well "A" (PWA), which was used in the past to supply potable, boiler, and fire-fighting water to the plant. Because VOCs were detected in the well as early as 1980, PWA's use as a water source was discontinued. It is now believed that contamination in PWA originated, at least in part, from the former TCE still that operated adjacent to Building 157 during 1959 and the early-1960s.

As noted in Section 1, Site 10 was part of a number of investigations conducted at ABL in the 1980s and early-1990s and a supplemental soil investigation conducted in July 2000. Information gathered these investigations indicated that limited VOC soil contamination exists in the vicinity of the former TCE still, but a VOC plume (specifically TCE) is present in both the alluvial and bedrock aquifers at Site 10. Based upon the risks identified for Site 10 groundwater during the Phase II RI, an FFS for Site 10 groundwater was completed in March 1998.

The Navy issued the PRAP for groundwater at Site 10 in March 1998 and signed an interim ROD in August 1998. The selected remedy, which was a modification of one of the alternatives listed in the FFS, was considered an interim action because it did not address the full extent of alluvial and bedrock aquifer contamination. The interim action was intended to contain and remove the most highly contaminated portion of the alluvial aquifer (i.e., TCE contamination greater than 100 μ g/l) before further downgradient migration could occur while other remedial actions (e.g., monitored natural attenuation) were considered for the less contaminated portion of the aquifers.

As noted above, a treatment facility was designed and constructed to remove hazardous constituents from the extracted groundwater at Site 1. The treatment plant began continuous operation in September 1998. Implementation of the interim remedial action at Site 10 (i.e., installation of three groundwater extraction wells) was completed in February 1999, at which time groundwater extraction at Site 10 with subsequent treatment at the Site 1 treatment plant began.

After several months of groundwater monitoring at Site 10, it became evident that the existing extraction-well configuration was capturing all but the most northeastern portion of the alluvial-aquifer TCE plume and that the installation of one additional alluvial extraction well might achieve complete plume capture. A direct-push groundwater investigation was performed in June 2000 to further delineate the northeastern extent of the alluvial-aquifer TCE plume and determine the best location for installation of an additional alluvial extraction well. To achieve capture of the alluvial groundwater VOC contamination above MCLs at Site 10, a fourth alluvial extraction well was installed in the suspected northeastern tip of the TCE plume in July 2000. A monitoring well was also installed at the downgradient edge of the alluvial aquifer contaminant plume to verify hydraulic containment.

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Hydraulic head data gathered prior to and following extraction system startup at Site 1 has indicated that the vertical hydraulic gradient between the alluvium and bedrock at Site 10 has reversed (i.e., became downward), potentially under the influence of bedrock groundwater extraction at Site 1. To test this hypothesis and to evaluate the need for bedrock extraction at Site 10, an aquifer test was performed in July 2001.

The results of aquifer testing and modeling performed during Phase III Aquifer Testing indicate that bedrock groundwater extraction at Site 1 is limiting the effectiveness of the alluvial extraction wells at Site 10 in capturing the bedrock groundwater contamination. Groundwater modeling was used to evaluate the most effective way of overcoming the influence of groundwater pumping at Site 1 and determined that the addition of four bedrock extraction wells at Site 10 would result in groundwater contamination being contained at Site 10. These changes to the extraction system were implemented in February 2003 in accordance with the *Final Work Plan Site 10 Groundwater Extraction System Modification Allegany Ballistics Laboratory* (CH2M HILL, October 2002). This modified extraction/treatment system was selected as the final remedial alternative for Site 10 groundwater (as a modification of the interim action) in a ROD signed in September 2005.

Additional soil sampling was conducted at Site 10 in June 2000 to further delineate the extent of soil contamination associated with the former TCE still. Soil data collected at Site 10 during the RI, Phase II RI, and June 2000 soil sampling event were evaluated to determine the potential ecological and human health risk posed by the site. These data were evaluated and are presented in a Risk Assessment Report (CH2M HILL, July 2005). This report concludes that soil at Site 10 does not present an unacceptable risk to human health or the environment. In 2006 a PRAP was prepared for Site 10 soil that indicated that the preferred alternative for this media is NFA. A NFA ROD was signed for Site 10 soil in 2007. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for Site 10 (OU5) is functioning as intended by the ROD.

2.1.8 Site 11: Production Well "F" (F-Well)

The historical significance of Site 11 is the former existence of a boiler house (Building 215), fuel oil storage area, and a deep bedrock production well known as F-Well. The original boiler house, built in the late-1950s, was approximately 1,000 square feet and housed a single boiler unit. In 1961, F-Well was installed adjacent to Building 215 to provide potable water to Plant 1 as well as to the boiler housed in Building 215. Following its installation, attempts to develop F-Well were unsuccessful due to sand flowing into the well through fractures in the bedrock. Because the sand prevented pump operation in the well, F-Well was never put into production. However, it also was never properly abandoned. In 1962, an addition was added to the boiler house that doubled its size and number of boilers. During this expansion, F-Well was covered by the building addition's foundation.

In the late-1980s, the boiler house was decommissioned. Decommissioning activities included removal of the boilers and two 10,000 gallon aboveground storage tanks (ASTs). Prior to removal of the 55-gallon oil pit and dike walls in 1994, four soil samples were collected from within the diked oil storage area to evaluate the extent of impacted soil. The analytical results suggested soil within the diked area had been impacted by petroleum hydrocarbons. Soil samples collected after removal of the dike wall, oil pit, and all soil within the diked area and demolition of the former boiler house (Building 215) suggest that sufficient soil cleanup had been achieved. Subsequent to soil removal, Building 421 was constructed adjacent to F-Well. An asphalt parking lot was constructed around F-Well and over the former diked fuel storage area and oil pit.

In 1995, an Advanced Site Inspection (ASI) was conducted to characterize potential groundwater and soil contamination in and around F-Well (see **Figure 2-10**) and a former oil pit at the construction site for Building 421, the existing building adjacent to F-Well (CH2M HILL, February 1996). The ASI identified a limited area of soil contamination and an area of alluvial and bedrock groundwater contamination. Furthermore, LNAPL and DNAPL were detected in F-Well.

Based on the findings of the ASI, a RI was initiated at Site 11 in June 1998 to delineate the nature and extent of contamination in the soil and alluvial and bedrock aquifers in the vicinity of F-Well. It is believed that while overdrilling F-well during the RI, the LNAPL and DNAPL were removed. Based on this, quarterly sampling was initiated prior to preparation of the RI report. The fourth round of quarterly sampling was completed in February 2001.

An RI Report was completed in January 2005 that included human health and ecological risk assessments for Site 11 (CH2M HILL, January 2005). A single FS for Site 11 and Site 12 was completed in 2010. These sites are being evaluated together because the COCs identified at Site 11 and the Site 12 RI are similar, the alluvial and bedrock aquifers are the media where COCs are present at both sites, the sites are located adjacent to each other, and hydrogeologic connectivity likely occurs between the sites. The PRAP, which identifies the preferred remedial alternative for Site 11 as, focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls, was finalized in March 2011. The ROD is expected to be issued in September 2011.

2.1.9 Site 12: Building 167 SWMUs (formerly AOC N)

There are five SWMUs (SWMUs 12, 14, 24S, 37N, and 52) located in the vicinity of Building 167 that are considered part of Site 12 (formerly AOC N). Site 12 is located in the northwestern portion of Plant 1, just north of Site 11, as shown in Figure 2-11. A list of the SWMUs associated with Building 167 is provided below.

SWMU 12 Former Alodine Treatment Tank

SWMU 14 Current Alodine Waste Storage Area I (no longer in use)
 SWMU 24S Building 167 Satellite Accumulation Area I (outside building)

SWMU 37N Building 167 Wastewater Sump

• SWMU 52 Current Alodine Treatment Tank (no longer in use)

Several investigations have been conducted at two of these units. SWMU 37N and SWMU 52 were included in the scope of the Phase I and Phase II SWMU/AOC Investigations. In addition, a removal action was performed in November 2000 to remove the wastewater sump (SWMU 37N), its contents, and potentially contaminated soil immediately surrounding the unit. The results of the SWMU/AOC Investigations and post-confirmatory soil sampling indicated that several inorganic constituents (i.e., antimony, cadmium, chromium, iron, mercury, and thallium) and several organic constituents (i.e., TCE, 1,4-dichlorobenzene, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene) were present in soil above risk-based screening criteria. Several inorganic constituents (i.e., aluminum, arsenic, cadmium, chromium, cobalt, iron, manganese, nickel, vanadium, and zinc) and several organic constituents (i.e., 1,1-dichloroethylene [1,1-DCE], TCE, vinyl chloride [VC], 1,2-dichlorobenzene, 1,4-dichlorobenzene, and benzene) were also detected in groundwater above risk-based screening criteria. Therefore, AOC N was recommended for further investigation during a Phase III SWMU/AOC Investigation to further define the nature and extent of contamination at the unit.

During the Phase III SWMU/AOC Investigation, VOC contamination was discovered in the alluvial aquifer. A large area of the plume is centered around Building 167, and contains primarily TCE. The smaller area of the plume is centered around the former SWMU 37N wastewater sump, and exhibits high levels of methylene chloride. Based upon these findings, the recommendation was made that AOC N be designated IR Site 12.

Though the horizontal extent of VOCs in the alluvial groundwater at AOC N were well defined during the course of Phase III investigation activities, the vertical and horizontal extent of bedrock groundwater contamination was not. Therefore, an RI is currently being conducted at Site 12 to fill the data gaps identified during the Phase III SWMU/AOC Investigation. The proposed RI activities for Site 12 are presented in the Final Work Plan Addendum for Phase III Investigations at SWMUs 27A and 37V and for Remedial Investigation of Site 12 (CH2M HILL, January 2003).

Field investigations were initiated in 2003 as part of an RI designed to address data gaps identified following the Phase III SWMU/AOC Investigation. Remedial investigation activities at Site 12 included the installation and sampling of six alluvial and bedrock groundwater monitoring locations, downhole geophysical surveying, including flow logging and limited packer testing, and dye tracer testing. Groundwater sampling and data evaluation activities are expected to be completed in 2005.

Results of the field investigation identified human health and ecological risks from chromium, benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene in the soil at the site. In addition, cadmium, mercury, and 1,2-dichlorobenzene were identified as additional COCs for the ecological receptors. Therefore, an EECA was prepared in August 2004 that recommended excavating the contaminated soil at Site 12 and disposing of it in an off-site landfill. These activities were completed in 2005 and are documented in *Final Site 12 Soil*

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Removal Action Report (CH2M HILL, November 2005). Groundwater data were evaluated in a draft RI report for Site 12 that was issued in February 2007. The RI was finalized in 2009. A single FS for Site 11 and Site 12 was completed in 2010, as discussed above. The PRAP, which identifies the preferred remedial alternative for Site 11 as, focused enhanced anaerobic biodegradation, monitored natural attenuation and institutional controls was finalized in March 2011. The ROD is expected to be issued in September 2011.

2.1.10 Site 13: OU15 Range Road Area (formerly SWMU 27A)

The Range Road Area of SWMU 27A consists of an area of TCE contamination in alluvial groundwater, at an area where the SWMU27A drainage ditch crosses Range Road. The range Road Area is located in the southeastern portion of Plant 1. The current sampling locations for the Range Road Area are shown in Figure 2-12.

The Range Road Area was initially identified by tracking TCE detected at stream-sampling locations during routine analyses conducted for ABL's NPDESpermit. Follow-up surface water sampling detected TCE in the Plant 1 drainage ditch system near where it intersects Range Road. These surface water detections led to the installation of direct push temporary piezometers, which identified an area where TCE and other VOCs were detected in groundwater. The results of the direct push investigation were used to guide the installation of groundwater monitoring wells. A pilot study was completed in the area where the highest concentrations of TCE were detected in alluvial groundwater. This involved enhanced bioremediation using an emulsified oil substrate that was demonstrated to be successful in treating the TCE.

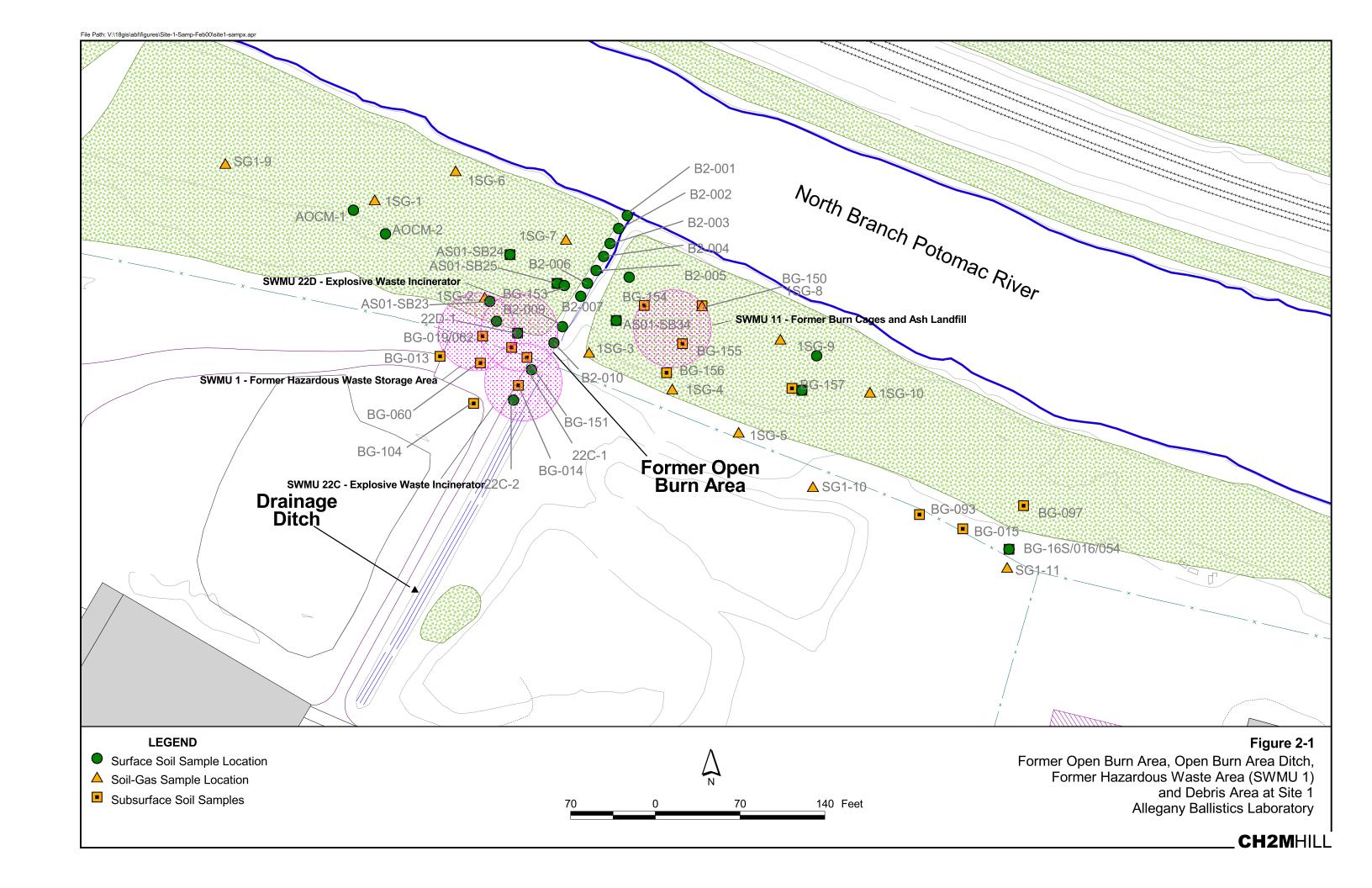
Following the initial pilot study, field work was completed to further delineate the extent of VOCs in the alluvial aquifer. Results from this sampling event identified the highest groundwater concentrations of VOCs in the area between G Street, Range Road, H Street, and the Plant 1 drainage ditch. During the execution of this field work light non–aqueous phase liquid (LNAPL) was observed at the ground surface near well GGW23. Subsequent sampling detected total petroleum hydrocarbon (TPH)—gasoline range organics (GRO) and TPH—diesel range organics (DRO) is some wells. Because no specific historical source or release event has been identified for VOCs in the Range Road Area, a membrane interface probe (MIP) survey was performed to determine if there was a VOC source related to LNAPL or TPH in the vadose zone. The results of the investigation did not identify a continuing source area and suggested that the vadose zone source of TCE in groundwater in the Range Road Area has either degraded or been leached from the soil.

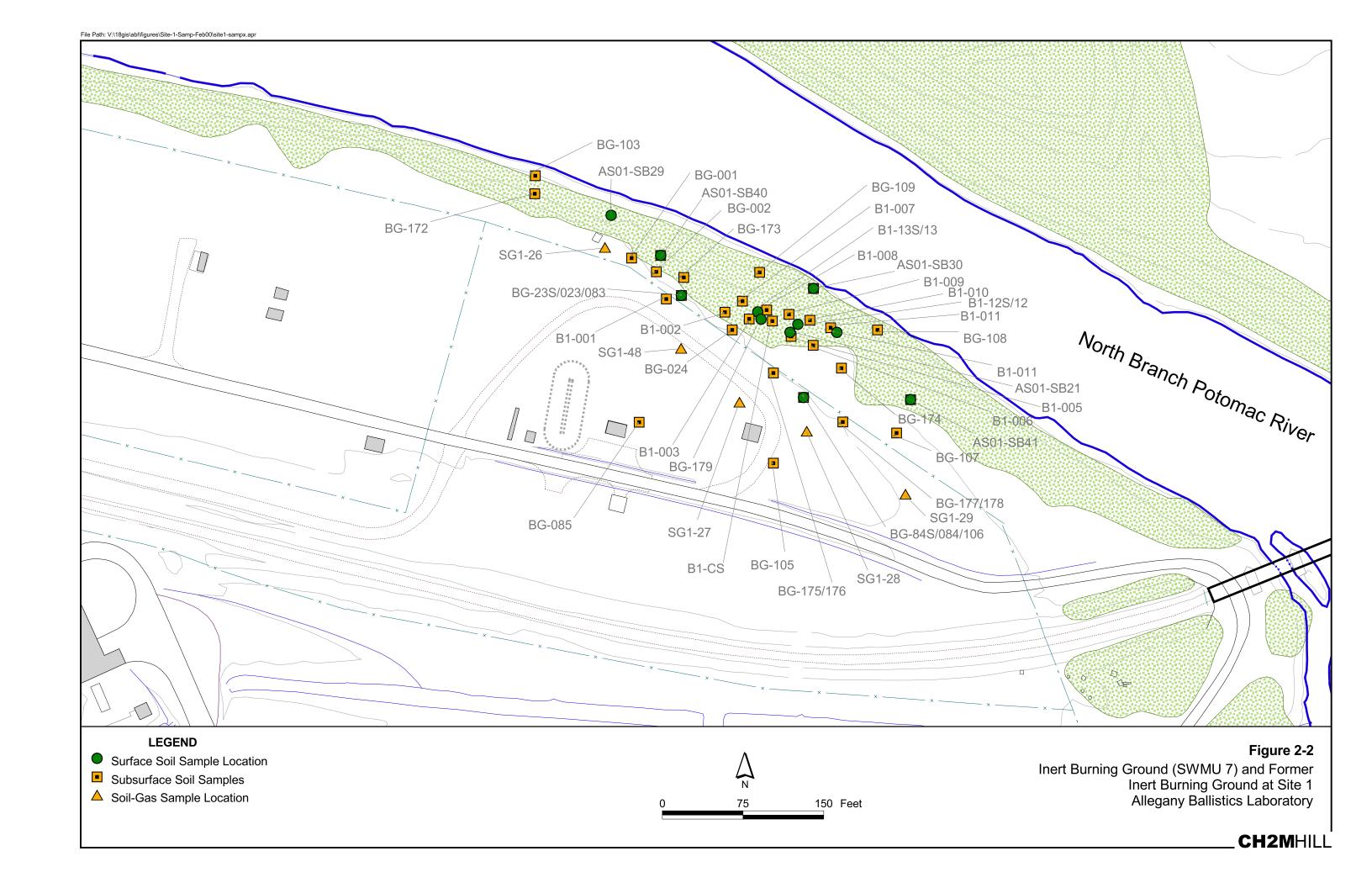
In 2008, the Range Road Area of SWMU 27A was designated as Site 13, OU-15. A second stage pilot study of enhanced bioremediation in the alluvial aquifer was conducted in October 2008 to address VOCs. Currently, a remedial investigation of Site 13 is underway.

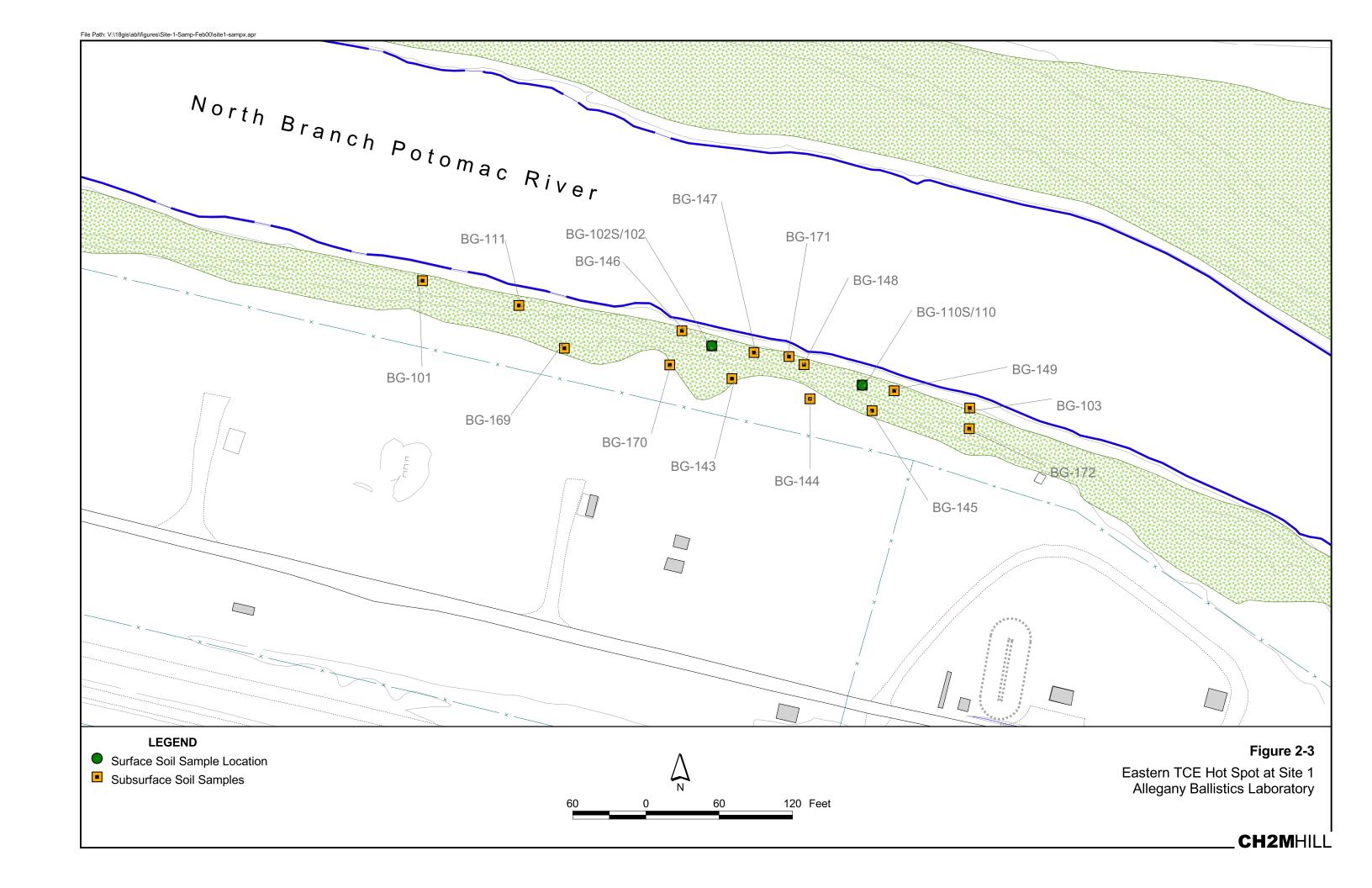
2.1.11 Building 8/Lab Row Area

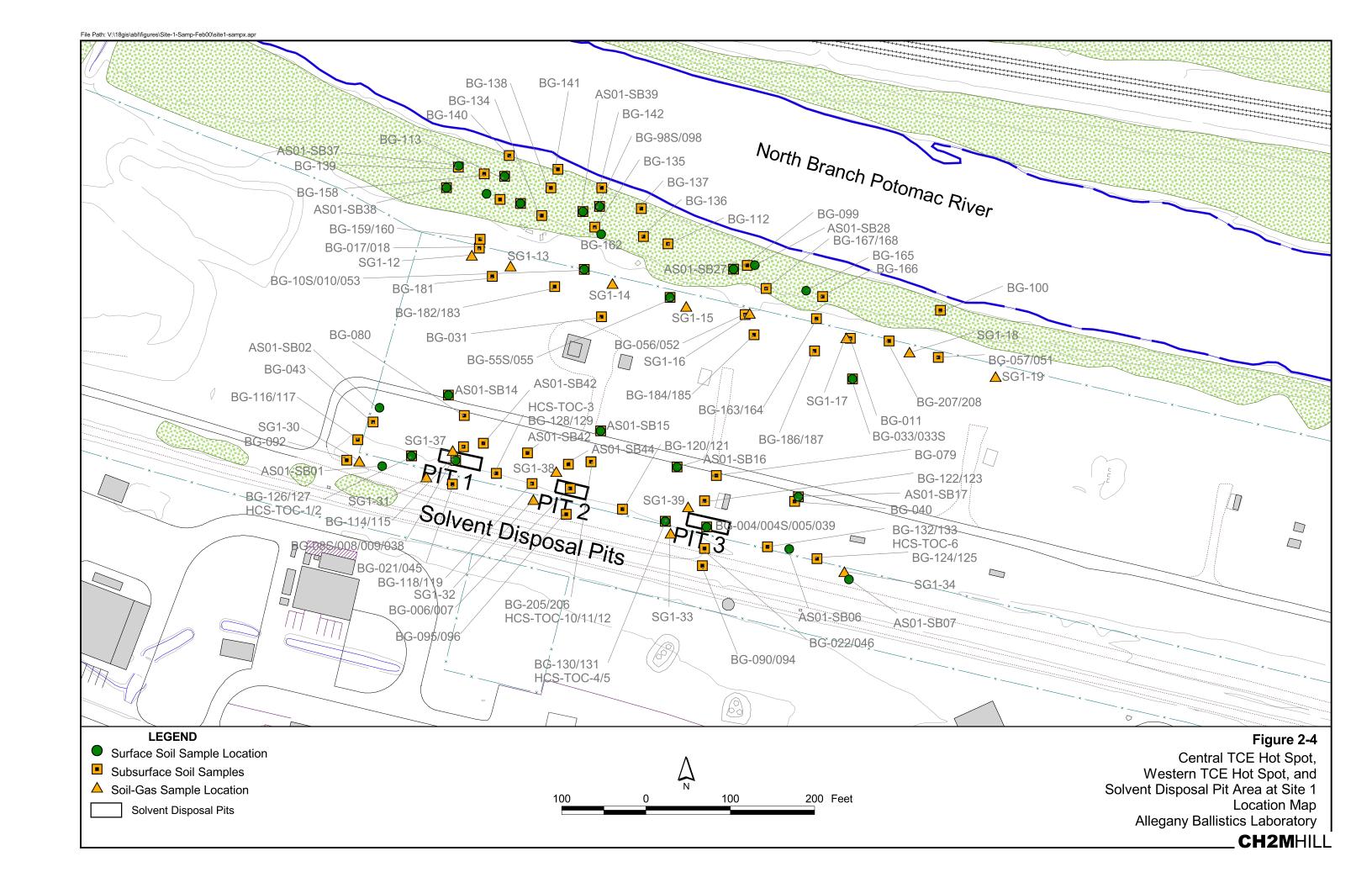
The Building 8/Lab Row Area is located in the southwestern developed portion of Plant 1 and has been used for a variety of research and development purposes (Figure 2-13). Site topography is relatively flat consisting of high density development and urban landscaping; future land use is expected to remain the same. Groundwater in the Building 8/Lab Row Area is not used as a potable drinking water source, nor is it expected to be used as a potable drinking water source in the future. Currently, groundwater in the area is believed to be captured by the nearby Site 10 extraction well network.

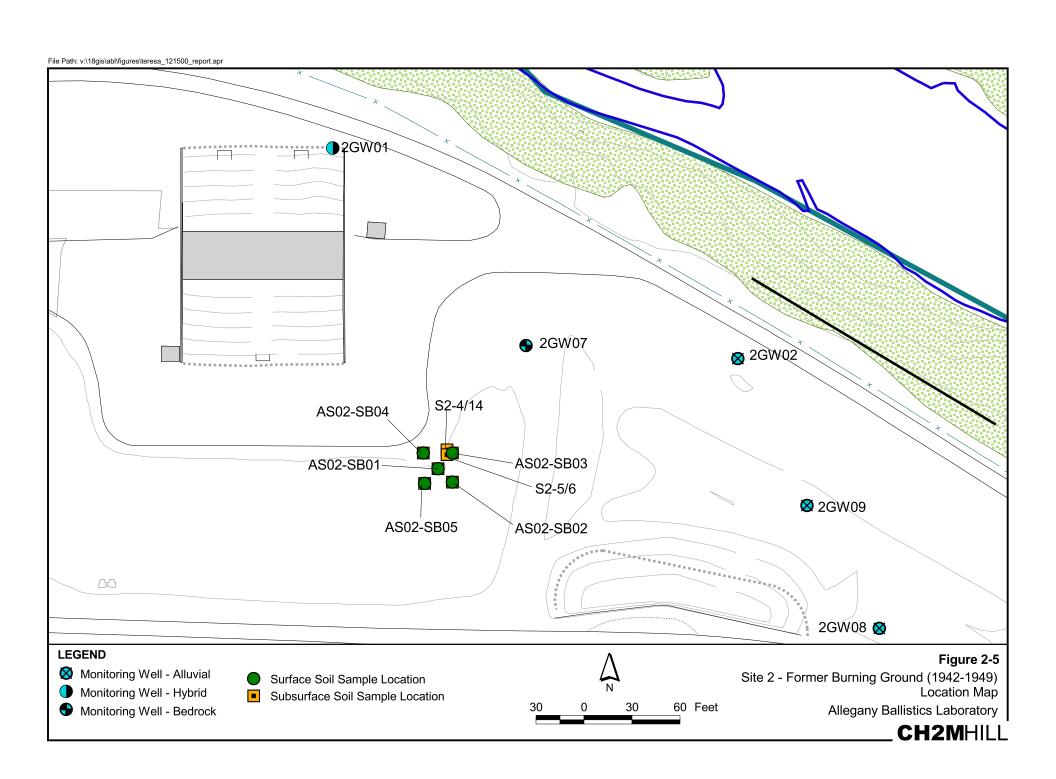
A variety of research and development activities have been conducted in the buildings and former buildings of the Building 8/Lab Row Area since the 1940s. The area encompasses a number of active and closed SWMUs related to former area activities that were identified during the Phase II RCRA Facility Assessment (A.T. Kerny, 1993). Removal actions were conducted as necessary to reach closure status for soil. The groundwater however, has only been investigated at SWMUs where there was an expected complete pathway to the groundwater. The ABL Partnering Team concurred in 2009 that the groundwater in the Building 8/Lab Row area and downgradient needed to be evaluated and could be done as one "unit." Therefore groundwater associated with SWMU 37E and 37W are currently under investigation as part of a PA/SI as a result of VOCs and explosive constituents detected in soil and groundwater during previous investigations.

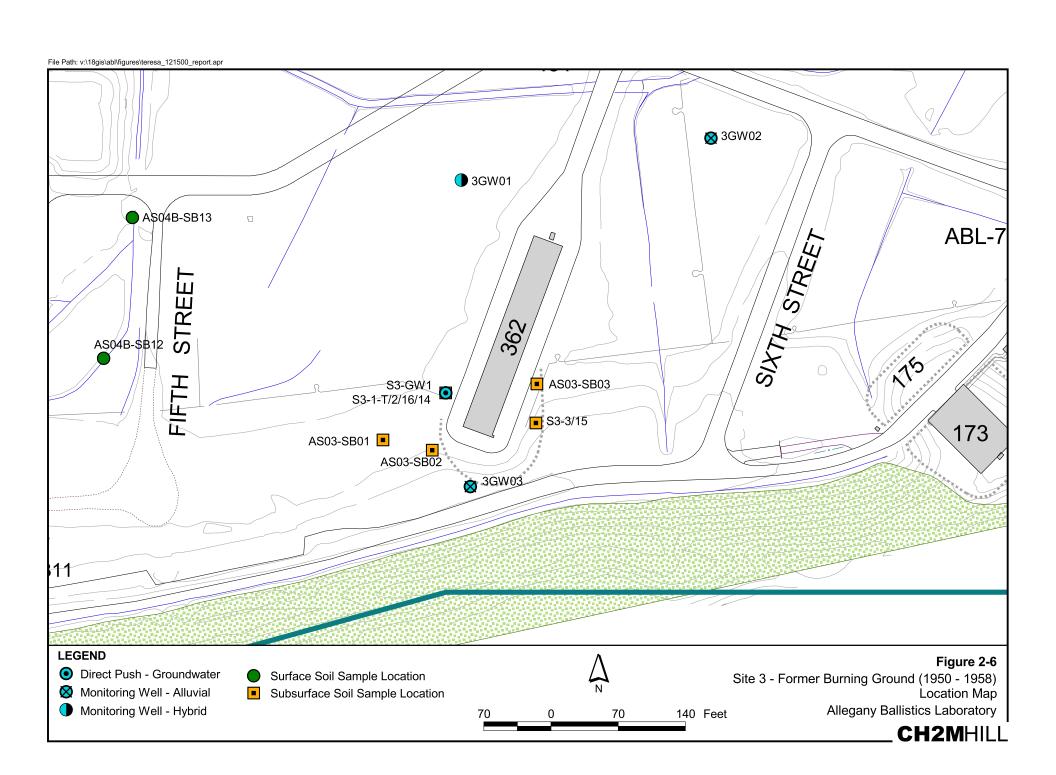


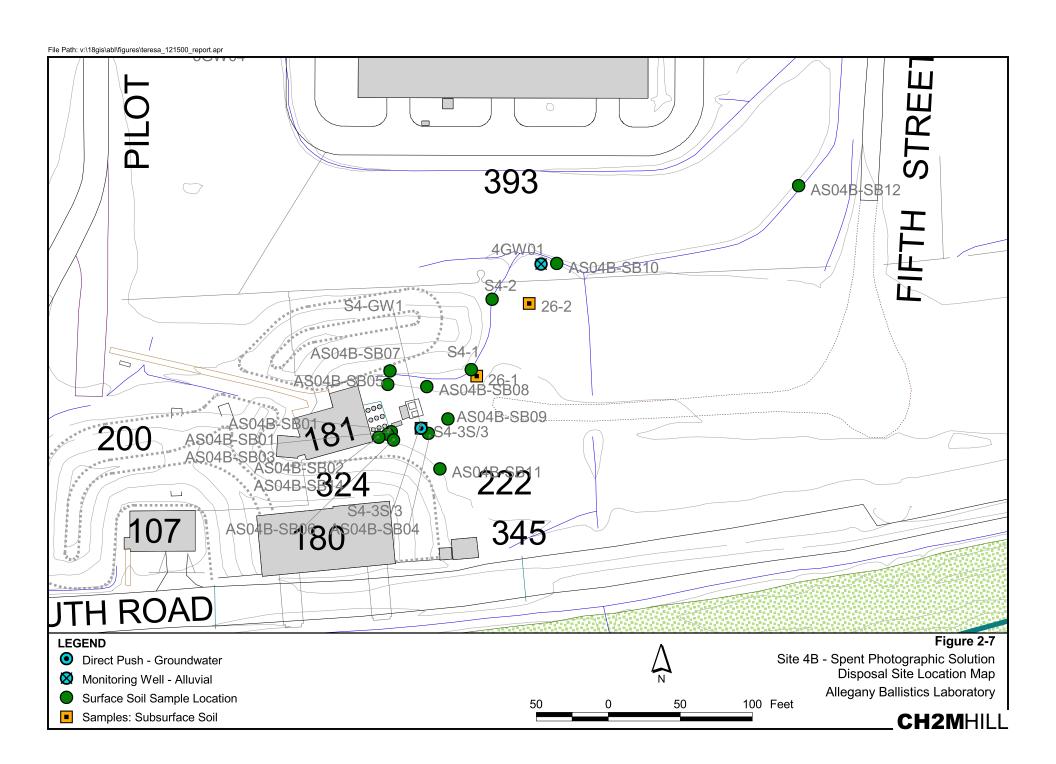


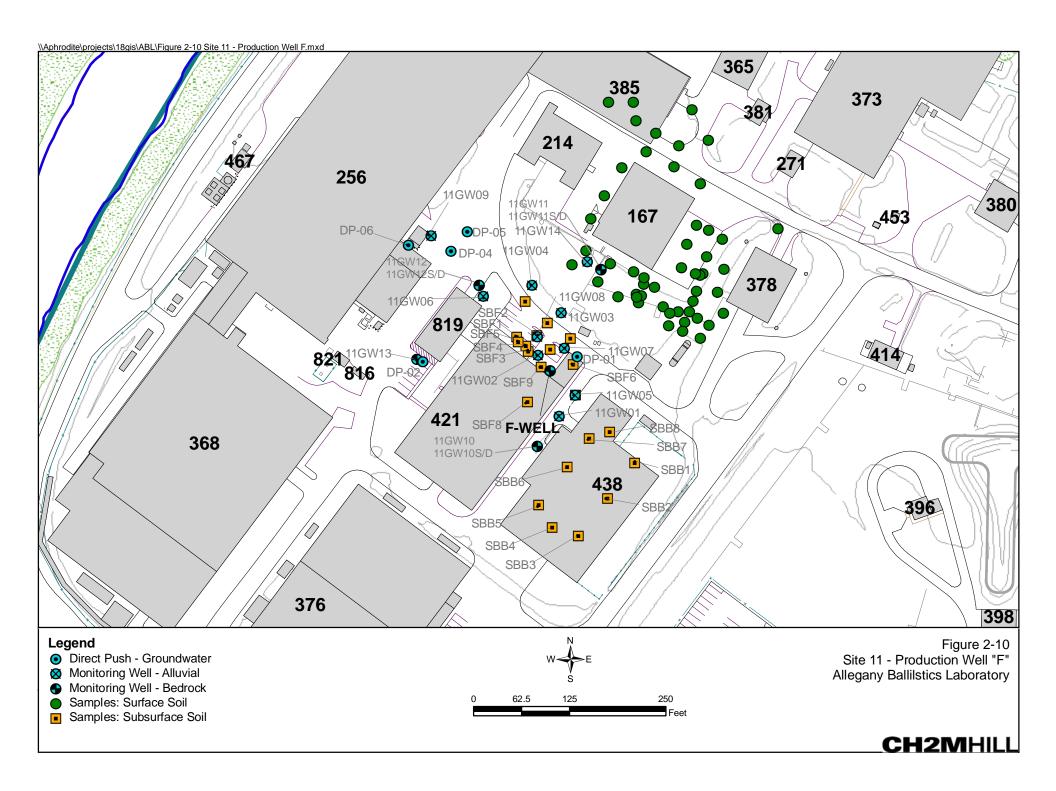


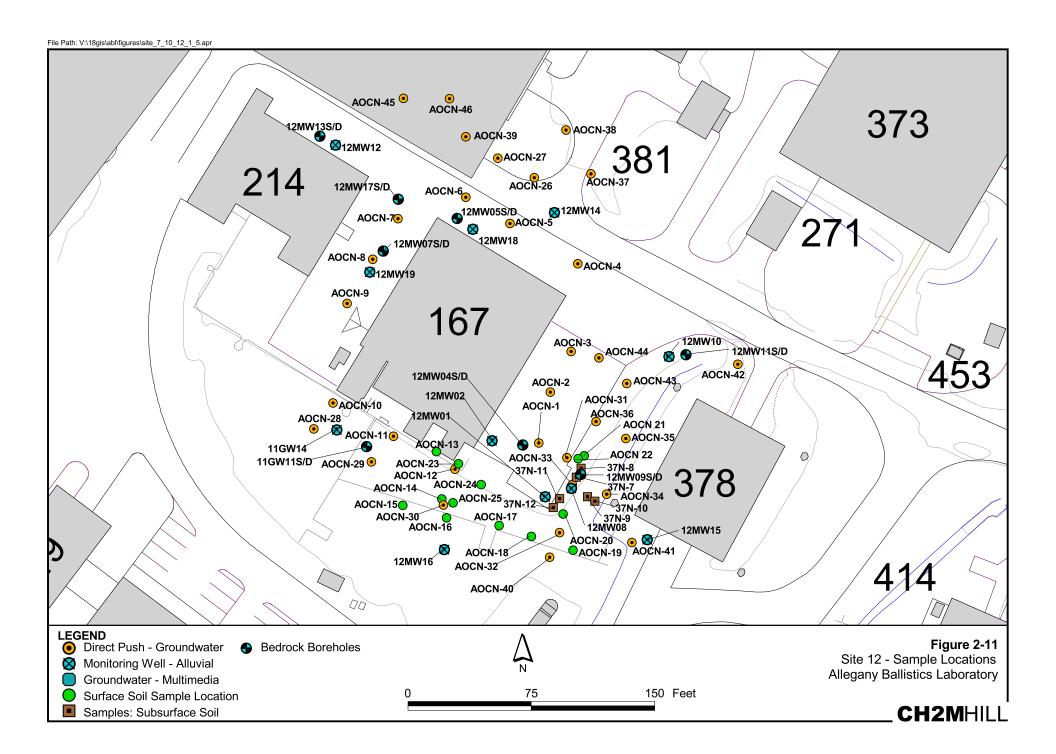


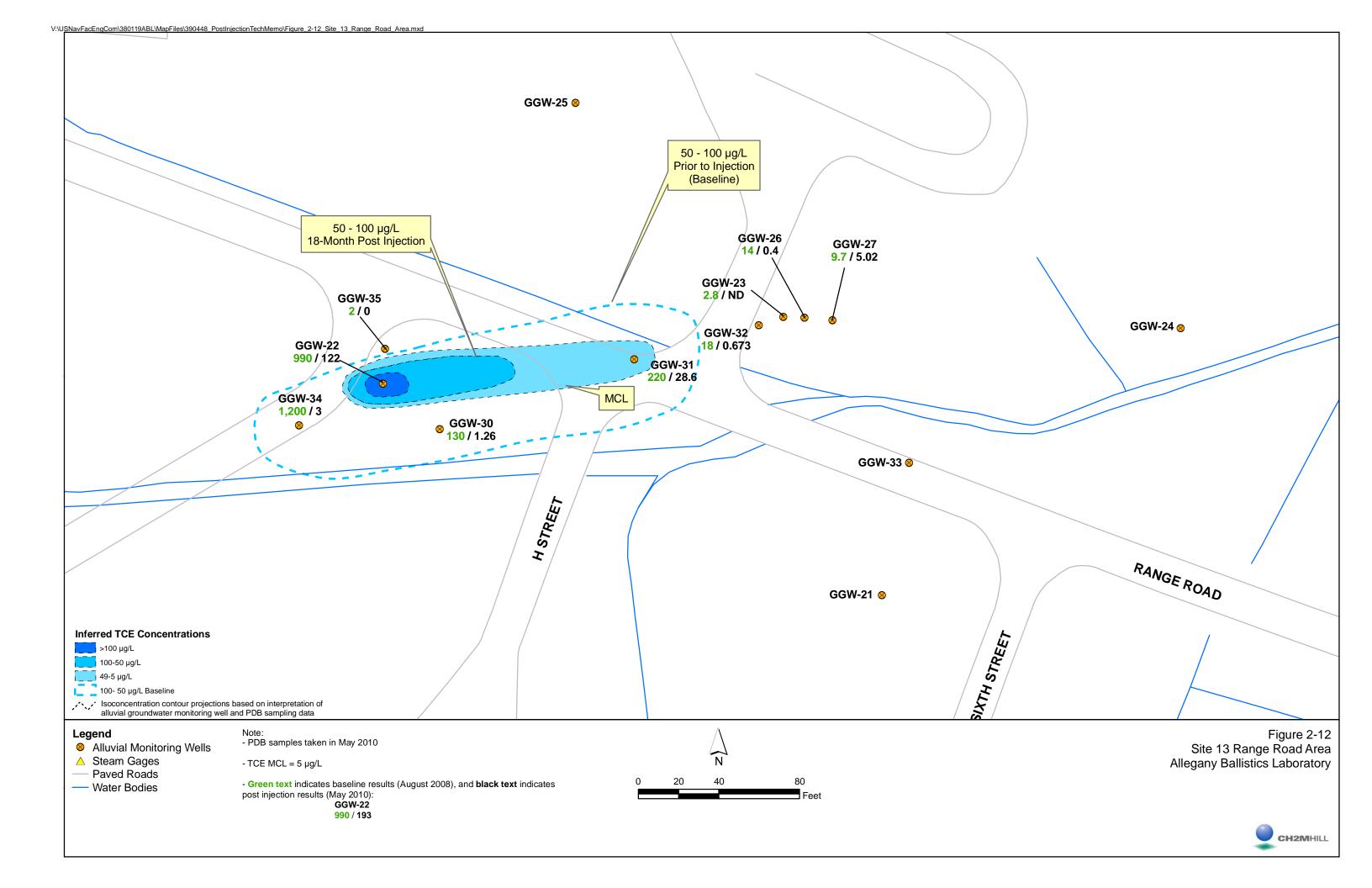












CERCLA Process Activities

CERCLA activities at ABL are currently conducted through the IRP. Since 1986, the Navy's IRP has followed the process prescribed by CERCLA regulations and guidance for investigating and addressing environmental contamination. This multi-step process is followed regardless of whether or not a facility is listed on the NPL, unless otherwise directed by a RCRA consent order or other legal instrument.

3.1 CERCLA Process

Because the Navy structured the IRP to be consistent with the terminology and structure of the CERCLA program, the placement of Plant 1 on the NPL has had a limited effect on the cleanup processes that were already established. The IRP at ABL is being implemented in accordance with applicable federal and state environmental regulations and requirements. The CERCLA cleanup process is described below.

3.1.1 CERCLA RI/FS Process

The CERCLA RI/FS process refers to the process of site investigation and remedial action that is used for CERCLA sites.

The objectives of the CERCLA RI/FS process are to evaluate the nature and extent of contamination at a site and to identify, develop, and implement appropriate remedial actions in order to protect human health and the environment. The RI/FS process includes the following major elements:

- 1. **Preliminary Assessment /Site Inspection (PA/SI):** The PA is the initial process of collecting and reviewing existing information, including historical records; aerial photographs; field inspections; and personnel interviews, to identify specific potentially-contaminated sites. If such sites are identified, limited sampling is conducted under the SI to either confirm or deny the presence of contaminants.
- Remedial Investigation/Feasibility Study (RI/FS): If the PA/SI confirms the presence of contamination, a RI is
 conducted to further evaluate the nature and extent of contamination and to perform a risk assessment for
 human health and the environment. This process is also called "characterization." Using the RI data, a FS is
 then prepared to evaluate a range of options for environmental remediation, analyzing both available
 technologies and estimated costs.
- 3. **Proposed Remedial Action Plan (PRAP or Proposed Plan):** As a public participation requirement under CERCLA, the preferred environmental restoration strategy, rationale, and the remedial alternatives evaluated in the FS are summarized, either as a fact sheet or as a separate PRAP document. Public review and comment on the fact sheet or PRAP are actively solicited.
- 4. **Record of Decision (ROD):** The ROD is a public document that explains which remedial alternative was selected for a specific site, on the basis of the technical analysis in the RI/FS and consideration of public comments and concerns about the PRAP. All parties directly involved in the restoration program (Navy, USEPA, and WVDEP in the case of ABL) must agree on the selected alternative.
- 5. **Remedial Design/Remedial Action (RD/RA):** The RD is the detailed engineering design and the RA is the actual construction and/or implementation of the remedy that has been selected for a site. Where no further action is required at a site, a no-action ROD would be signed and the site removed from the program.

The PA/SI, RI/FS, and PRAP documents are maintained by the Navy in the administrative record. A formal public comment period and a public meeting (if required) generally follow the issuance of the Final PRAP. Public comments received on the Final PRAP are addressed as part of the Responsiveness Summary in the ROD. Subsequent to completion of the ROD, RD/RA activities are initiated. Remedial Action is currently in progress at three ABL sites: Site 1 (groundwater), Site 5 (landfill contents and surface soil), Site 5 (groundwater) and Site 10 (groundwater).

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3.1.2 Removal Action Process

Removal actions are implemented to cleanup or remove hazardous substances from the environment at a site in order to mitigate the spread of contamination. Removal actions may be implemented at any time during the CERCLA process.

Removal actions are classified as either time-critical or non-time-critical. Actions taken immediately to mitigate an imminent threat to human health and the environment, such as the removal of corroded or leaking drums, are classified as time-critical removal actions. Removal actions that may be delayed for 6 months or more without significant additional harm to human health or the environment are classified as non-time-critical removal actions.

For non-time-critical removal actions, an Engineering Evaluation/Cost Analysis (EE/CA) is prepared rather than the more extensive FS. An EE/CA focuses only on the substances to be removed rather than on all contaminants at the site. It is possible for a removal action to become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment.

3.1.3 Remedial Action Process

Remedial actions may be considered interim remedial actions or final remedial actions. Interim remedial actions are implemented to provide temporary mitigation of human health risks or to mitigate the spread of contamination in the environment. Similar to removal actions, they may be implemented at any time during the RI/FS process. An interim remedial action is implemented to attain applicable or relevant and appropriate requirements (ARARs) to the extent required by CERCLA or the NCP. It is also consistent with and contributes to the efficient performance of a final remedial action taken at a site or Operable Unit. Examples of interim remedial actions include installation of a pump-and-treat system for groundwater "hotspot" capture or installation of a fence to prevent direct contact with hazardous materials.

For interim remedial actions, an FFS may be prepared rather than the more extensive FS. As with the removal action, an interim remedial action may become the final remedial action if the risk assessment results indicate that no further remedial action is required in order to protect human health and the environment. In this case, a no further action ROD would be signed and the site removed from the program upon completion of the interim remedial action.

If the more extensive FS process is followed, a preliminary/conceptual remedial design, a prefinal remedial design, and then a final remedial design are developed for final remedial action at an area or Operable Unit. After completion of the remedial action at each area or Operable Unit, a Remedial Action Completion Report is prepared. If necessary, a Long-term Monitoring Plan (LTMP) and an Operation and Maintenance (O&M) Plan also are prepared for each remedial action site.

3.1.4 Treatability Studies

Treatability studies are performed to assist in the evaluation of a potentially promising remedial technology. The primary objectives of treatability testing are:

- To provide sufficient data to allow treatment alternatives to be fully developed and evaluated during the FS, and/or
- To support the remedial design of a selected alternative

Treatability studies may be conducted at any time during the RI/FS process. The need for a treatability study is generally identified during the FS.

Treatability studies may be classified as either bench-scale (laboratory) or pilot-scale (field studies). Bench-scale studies are often sufficient to evaluate performance for technologies that are well developed and tested. For innovative technologies, pilot tests may be required to obtain the desired information. Pilot tests simulate the physical and chemical parameters of the full-scale process, and are designed to bridge the gap between bench-scale and full-scale operations.

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3.2 FFA CERCLA Integration Process

The Federal Facility Agreement (FFA) developed for ABL by the Navy, USEPA Region III, and WVDEP is intended to assist the Navy in meeting the provisions of CERCLA, RCRA, and applicable State law. The FFA establishes a procedural framework and provides detailed guidance on all phases of the remediation process from investigation through remedial action.

3.2.1 AOC Evaluation

Areas identified as Areas of Concern (AOCs) in the FFA, undergo a document evaluation. This document evaluation involves a thorough review of existing or easily obtainable documentation and information on the identified areas. If the Navy, USEPA, and WVDEP agree, the evaluation could include obtaining discrete samples from the AOC.

The document evaluation also involves assessing information concerning the handling of hazardous wastes at each AOC, the actions taken at each AOC, or actions that will occur under other regulatory programs at each AOC. Based upon the AOC evaluation, a decision is made by the management team of which AOC will proceed to the Site Screening Process as SSAs and which AOCs will require no further action and can be closed out. For those AOCs requiring no further action, an AOC closeout document is prepared.

3.2.2 Site Screening Process

The Site Screening Process (SSP) refers to the process described in the FFA that is used to identify whether SSAs should proceed into the RI/FS process under CERCLA. SSAs are those areas that may pose a threat or that do pose a threat to public health, welfare, or the environment. SSAs can be identified by the Navy, WVDEP, or the USEPA. An SSP work plan is then prepared outlining the activities necessary to determine if there have been releases of hazardous substances, pollutants, contaminants, hazardous waste, or other hazardous constituents to the environment from the SSAs. After investigation activities have been performed, an SSP report is prepared. The report provides a basis for a determination that either (1) an RI/FS be performed at the SSA or (2) the area does not pose a threat to public health, welfare, or the environment and therefore should be removed from further study. For SSAs that do not warrant an RI/FS under CERCLA, a brief decision document is prepared and signed by the Navy, USEPA, and WVDEP, in the case of ABL.

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Site Management Plan Schedules

This section presents schedules for response actions planned from 2010 through the ABL project end date. Project-specific schedules for active projects will be updated periodically in the SMP. For projects that are active, the current project schedules are presented. For projects that have not yet been initiated or for which project schedules have not been developed, scheduling assumptions are discussed below.

4.1 Partnering Team at ABL

Team partnering was introduced to ABL to streamline the cleanup of former disposal sites by using consensus-based site management strategies during the CERCLA process. Originally, the partnering team (the Team) consisted of the Navy, restoration advisory board (RAB), USEPA, WVDEP, MDE, and Navy's contractors. However, MDE is no longer actively involved with the Team. The implementation of the streamlined oversight process has promoted a higher degree of communication, understanding, and cooperation among all of the involved groups to help reduce costs and expedite cleanup and closure of IR sites.

The scheduling assumptions presented below represent an ideal flow of work for sites that are addressed through conventional cleanup approach. These assumptions do not account for how the streamlined oversight process may affect schedules and potentially affect the sequence of tasks, as the Team evaluates project progress on an accelerated basis, and expedites the decision-making process. The goal of the streamlined oversight process is to streamline the regulatory review processes of implementation, decision-making, reporting, and other environmental regulatory documentation, and to achieve significant savings of time and funds.

4.2 Scheduling Assumptions

Assumptions regarding duration of field investigations, laboratory analyses, data validation, document preparation, document review, and remedial design/remedial action are discussed below.

4.2.1 Field Investigation and Laboratory Analysis/Validation

The time required for RI field investigations depends upon the size and complexity of the site and the overall scope of the field investigation (e.g., types of field investigation activities, number of sampling rounds, etc.). Field investigations generally require several weeks to several months to complete.

Twenty-eight days is the standard turnaround time for approved laboratories under the current Navy CLEAN Contracts. Therefore, a 28-day turnaround time and a 14-day duration are generally assumed for standard laboratory analysis and for full validation of laboratory data, respectively. Depending on individual field events, laboratory and validation durations may vary slightly from the standard durations described above.

4.2.2 Document Preparation and Document Review

The time required for document preparation under the RI/FS process has been estimated based on prior experience in preparing the various types of documents. A summary of the estimated times required for development of the various types of documents typically prepared during the RI/FS process is presented in **Table 4-1**. The durations presented in **Table 4-1** represent the time required to prepare the initial draft document and do not include time required for review and subsequent revisions of the document.

The time required for document review generally will vary according to the length and complexity of the document, as well as the availability of resources on the part of the reviewing agencies. In accordance with the FFA, unless mutually agreed upon by the partnering Team, all draft documents will be subject to a 60-day review and comment period. There are two exceptions to the time periods required for review and comment on documents in the FFA. According to the FFA, prefinal remedial designs will be subject to a 45-day review and comment period and final remedial designs will be subject to a 14-day review and comment period. In the event

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that significant changes are made to the design between the prefinal and final designs, the USEPA may extend the review period for another 14-days. As discussed in the FFA, in some cases the review and comment period on draft remedial designs and remedial action work plans may need to be expedited for the Navy to satisfy CERCLA requirements.

In many cases, the Navy may choose to have a concurrent review period for draft documents. In those cases, no initial NAVFAC/Activity review would be required for the draft document.

For this SMP, it was assumed that the Navy and regulatory agencies will conduct concurrent reviews on documents. If an initial Navy review is required the schedules will need to be extended. Also, it was assumed that 15 days would be required by the consultant to address the regulator comments on the draft final document and to prepare and submit the final document.

4.2.3 Remedial Design/Remedial Action

The time required for remedial design/remedial action (RD/RA) depends on the type and complexity of the proposed remedial action. For example, the remedial design of a groundwater pump-and-treat system generally is much more complex than the remedial design for soil removal/offsite disposal. Therefore, the groundwater pump-and-treat remedial design process may require up to 1 year, whereas soil removal/off-site disposal remedial design may require less than 3 months. Similarly, the groundwater pump-and-treat system may operate for a long time (e.g., 10 to 30 years), whereas the soil removal/off-site disposal remedial action may be completed in less than 1 year. Therefore, schedules for RD/RA activities are only provided for projects where the type of remedial action to be performed is known. The remaining sites are only scheduled up through the ROD phase of the RI/FS process.

4.3 IRP Project Schedules

Project-specific schedules for ABL IRP projects that are or potentially will be active in FY 2012 are summarized in Table 4-2. The site specific schedules are provided in Figures 4-1 through 4-6. The basic strategy used during development of the IRP project schedules was to overlap the RI/FS and RD/RA activities to the maximum extent practicable. By overlapping activities, the overall project schedules are compressed without compromising the interdependencies of the various tasks and documents in the RI/FS process. The amount of overlap of tasks was based on the degree of dependency between the various tasks and documents. Key dependencies and related assumptions are outlined below.

- Remedial Investigation (RI): Preparation of the draft RI was assumed to start once all of the validated analytical data have been received. Certain RI tasks can begin before the data are validated; however, in order to prevent duplication of effort, this overlap was assumed to be only 2 weeks.
- Feasibility Study (FS): Preparation of the draft FS was assumed to begin approximately 4 months following the start of the RI. Many FS tasks are dependent on the nature and extent of contamination, which are generally defined in the RI report. Where appropriate to facilitate document review and improve efficiency, a combined RI/FS may be prepared rather than separate RI and FS documents.
- Proposed Remedial Action Plan (PRAP) and Record of Decision or Decision Document (ROD): A Preparation of
 the draft PRAP was assumed to start following receipt of agency comments of the draft Final FS, because
 selection of the proposed remedial action(s) in the PRAP/ROD is contingent upon agency approval of the
 recommended alternative.
- Because public comments received during the public comment period must be responded to in the Responsiveness Summary, preparation of the final ROD would not begin until closure of the public comment period.

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TABLE 4-1 Document Preparation Durations *Allegany Ballistics Laboratory*

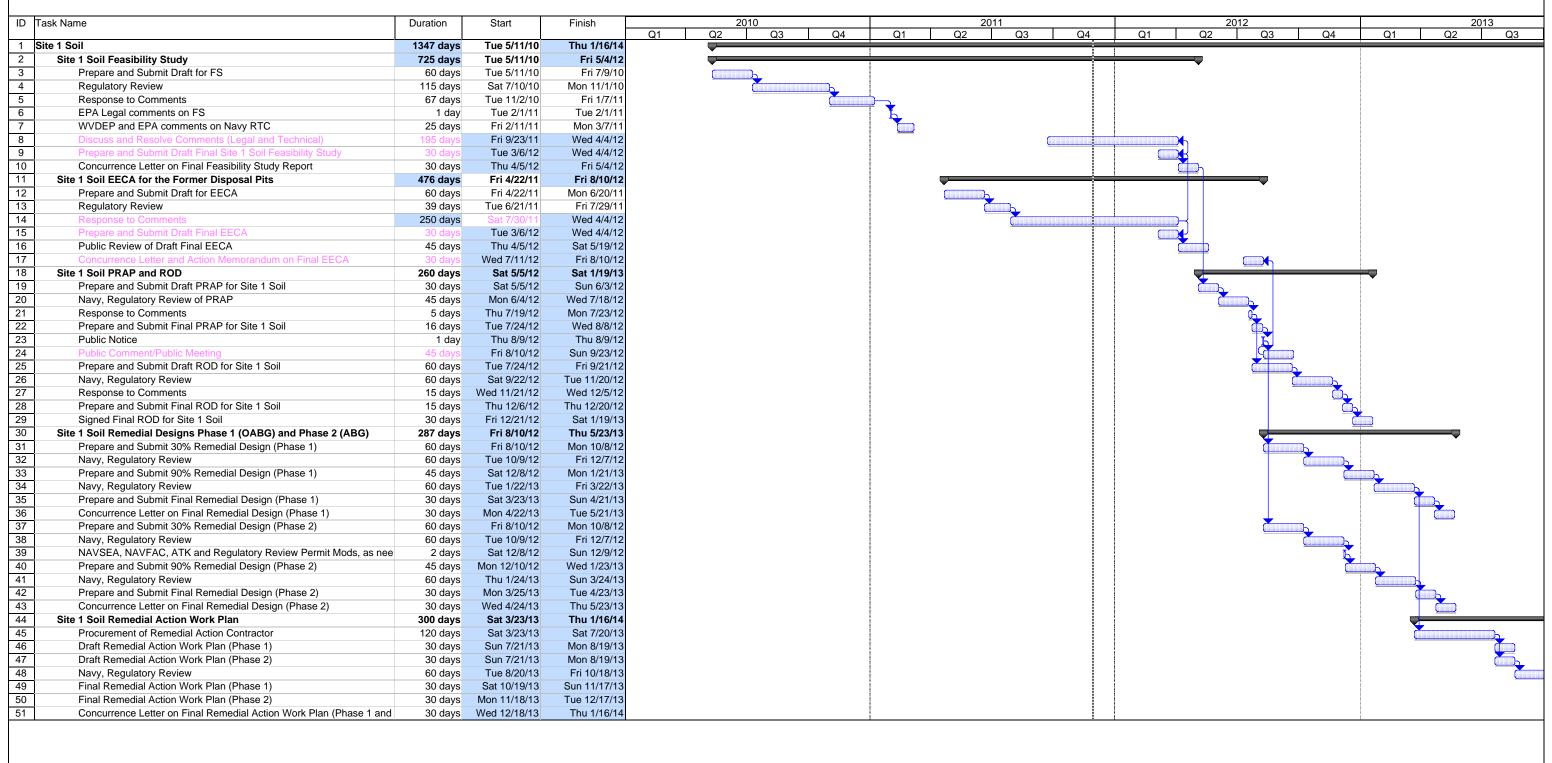
Document	Duration (Months) ¹
AOC Close-Out Document	1
SSP Work Plan	1
SSP Report	1-2
Preliminary Assessment/Site Inspection	2
Engineering Estimate/Cost Analysis	1-2
RI/FS Work UFP SAP	3
Remedial Investigation Report	1-2
Supplemental Investigation UFP SAP	3
Supplemental Investigation Report	1-2
Feasibility Study	2-3
Proposed Plan	1-2
Record of Decision	1-2
Preliminary/Conceptual Remedial Design	2
Pre-Final Remedial Design	2
Final Design	1-2
Treatability Study Work Plan	2
Treatability Study Report	1-2
Removal Action Work Plan	2
Removal Action Completion Report	1-2

¹ Durations represent estimated time required to complete draft documents.

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						2011						1					201												201						
January Long Term Monitoring (Sites 1, 5, and 10 Groundwater)	February	March	April	May	June	July	August	September	October	November Conduct LTM Sampling	December	January Draft LTM Report	February	/ March	April	May Final LTM Report	June		August LTM Sampling		October	November	December	January	February	March	April	May			August	September	October	November	December
Site 1 Soil					Draft EE/CA for FDPs										Draft Final FS/Draft Final EE/CA	Final FS and Final EE/CA	Draft PRAP		Draft Fina PRAP	PRAP, Draft ROD	30% Remedial Design (Phase 1) 30% Remedial Design (Phase 2)			90% Remedial Design (Phase1) 90% Remedial Design (Phase 2)		F (F F	Final Remedial Design (Phase 1) Final Remedial Design (Phase 2)		F # V	Remedial Action Work Plan	Action Work Plan		í	Remedial Action Work Plan	Final Remedial Action Work Plan (Phase 2)
Site 11 and Site 12											Final ROD; Draft SAP for Groundwater Sampling			Final SAP for Groundwa ter Sampling	Remedial Action Work Plan			Final Remedial Action Work Plan	n	Baseline Groundwa ter Sampling			Remedial Action Constructi on		F I	3 Month Post Injection Monitoring		F	Month Post njection Monitoring			9 Month Post Injection Monitoring			12 Month Post Injection Monitoring
Range Road Area										4th Round Post Injection Pilot Study Sampling		4th Round Post Injection Pilot Study Memo			Complete RI Sampling Activities				Draft RI/FS report						Final I RI/FS I report	Draft PRAP		C F	Praft Final [PRAP	Draft ROD		Final PRAP	I	Final ROD	
Building 8 (Lab Row) Groundwater Investigation						Well Installation and Groundwater Sampling				Groundwater Sampling				Draft Report of Findings					Final Report of Findings																
Site Management Plan and Land Use Controls											Draft IRACR for Sites 5 and 10		Final IRACR fo Sites 5 and 10	Draft Sites 1, 5, and 10 LUC RD Draft Sites 11 and 12 LUC RD	6	Final Sites 1, 5, and 10 LUC RD Final Sites 11 and 12 LUC RD Draft Site Management			Final Site Managen ent Plan	LUCIP for		Final LUCIP for Sites 1, 5, 10, 12, and 12		Draft 5 Year Review			I	Draft LUC F Implement Y ation Plan F (31)	'ear		Final LUC Implement ation Plan (1)				

Figure 4-1 Site 1 - Northern Riverside Waste Disposal Area Schedule Allegany Ballistics Laboratory



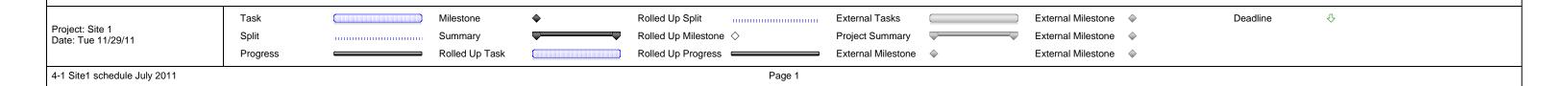


Figure 4-2 Sites 1, 5, and 10 Long Term Groundwater Monitoring Schedule Allegany Ballistics Laboratory

	Allegariy Ballistics Laboratory																			
ID T	ask Name	Duration	Start	Finish	r	4th Qu		1st Qua		2nd Qu		3rd Quarte		4th Quarter	1st Quarter	2nd Q		3rd Quarter		4th Quarter
						Oct No	v Dec	Jan Feb	Mar	Apr Ma	y Jun	Jul Aug	Sep	Oct Nov Dec	Jan Feb Mar	Apr Ma	ay Jun	Jul Aug	Sep	Oct Nov
1 S	ite 1, 5 and 10 Long-Term Groundwater Monitoring	360 days	Mon 10/3/11	Wed 9/26/12																
2	Long-term Groundwater Monitoring	360 days	Mon 10/3/11	Wed 9/26/12	2			•		•		!	$\overline{}$							
3	Long-term Monitoring for Sites 1, 5, and 10	76 days	Mon 10/3/11	Sat 12/17/17	1	<u> </u>														
4	Groundwater Sampling Event	31 days	Mon 10/3/11	Wed 11/2/11	1															
5	Sample Analysis and Validation	45 days	Thu 11/3/11	Sat 12/17/1	1		—													
6	Prepare and Submit Draft Interim Long-term Monitoring Report	209 days	Sun 12/18/11	Fri 7/13/12	2			1		<u> </u>										
7	Prepare and Submit Draft Interim Long-term Monitoring Report	45 days	Sun 12/18/11	Tue 1/31/12	2															
8	Regulatory Review	60 days	Wed 2/1/12	Sat 3/31/12	2					<u></u>										
9	Response to Comments	15 days	Sun 4/1/12	Sun 4/15/12	2															
10	Comment resolution	29 days	Mon 4/16/12	Mon 5/14/12	2															
11	Prepare and Submit Final Interim Long-term Monitoring Report	15 days	Tue 5/15/12	Tue 5/29/12	2					<u>d</u>										
12	Concurrence Letter on Final Interim Long-Term Monitoring Report	15 days	Wed 5/30/12	Wed 6/13/12	2															
13	UFP SAP update with respect to Final LTM report	30 days	Thu 6/14/12	Fri 7/13/12	2							<u> </u>								
14	Long-term Monitoring for Sites 1, 5, and 10	75 days	Sat 7/14/12	Wed 9/26/12	2							<u> </u>								
15	Groundwater Sampling Event	30 days	Sat 7/14/12	Sun 8/12/12	2															
16	Sample Analysis and Validation	45 days	Mon 8/13/12	Wed 9/26/12	2															

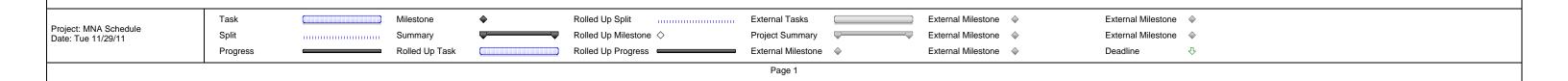


Figure 4-3 Building 8 Area, Groundwater Investigation Allegany Ballistics Laboratory

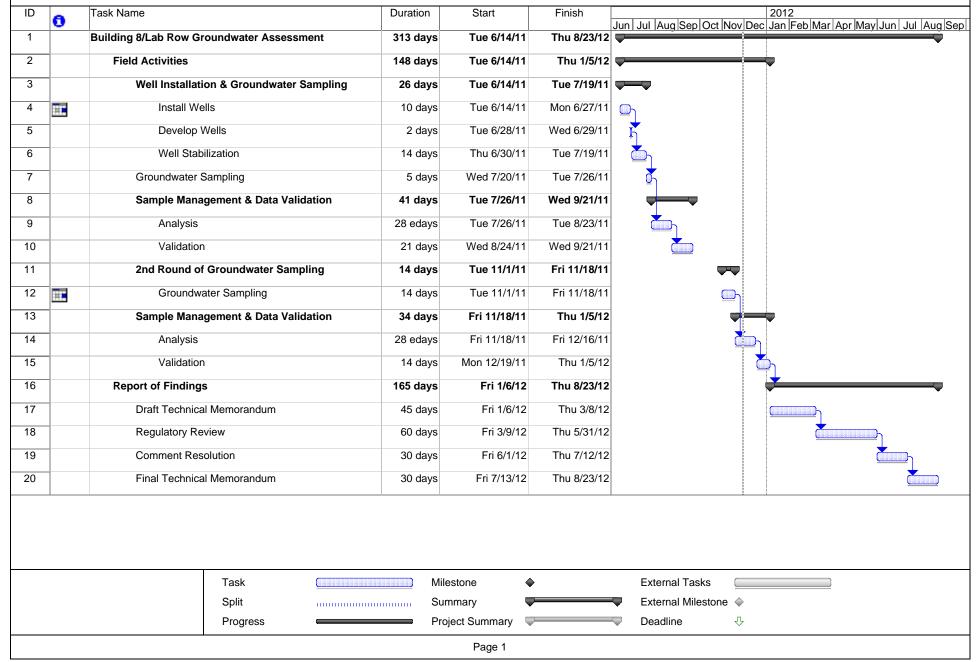
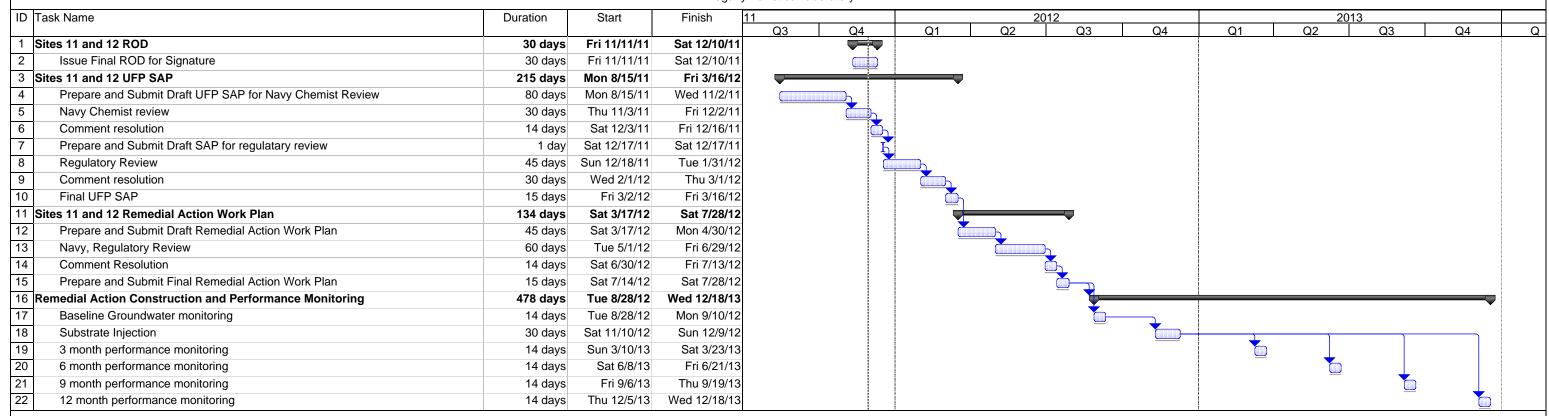


Figure 4-4 Sites 11 and 12 Schedule Allegany Ballistics Laboratory



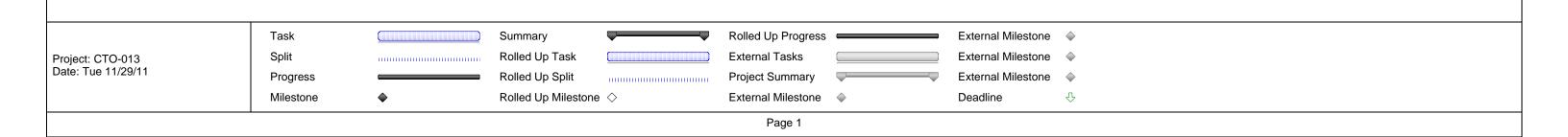


			Figure 4-5 SIte 13 (Range Road Area) Schedule Allegany Ballistics Laboratory	
D Task Name	Duration	Start	Sh 2011 2012 Q2 Q3 Q4 Q1 Q2 Q3 Q4	2013 Q1 Q2 Q3
1 Pilot Study Performance Monitoring	62 days	Wed 11/2/11	11/2/12	प्रा । प्रद । प्रज
Post-Injection Monitoring - Round 4	20 days	Wed 11/2/11	1/21/11	
3 Laboratory Analysis and Data Validation	42 days	Tue 11/22/11	1/2/12	
4 Pilot Study Technical Memorandum	20 days	Tue 1/3/12	1/22/12	
5 Prepare and Submit Interim Pilot Study P	erformance Memo - Round 4 20 days	Tue 1/3/12	1/22/12	
6 Implement Remedial Investigation at Site 13	360 days	Wed 6/1/11	5/25/12	
7 Monitoring Well Installation & Environmer	ital Sampling 360 days	Wed 6/1/11	5/25/12	
8 Remedial Investigation and Feasibility Stud	ly Site 13 286 days	Sat 5/26/12	3/7/13	
9 Data Review and Analysis	30 days	Sat 5/26/12	6/24/12	
10 Prepare and Submit Draft RI/FS Report	61 days	Mon 6/25/12	8/24/12	
11 Navy Review	30 days	Sat 8/25/12	9/23/12	
Prepare and Submit Draft RI/FS Report	30 days	Mon 9/24/12	0/23/12	
13 Regulatory Review	60 days	Wed 10/24/12	2/22/12	
Response to Comments	15 days	Sun 12/23/12	11/6/13	1
15 Prepare and Submit Final RI/FS Report	30 days	Mon 1/7/13	2/5/13 (
Concurrence Letter on Final RI/FS Report	30 days	Wed 2/6/13	ı 3/7/13	2/6
17 PRAP for Site 13	191 days	Fri 3/8/13	9/14/13	
Prepare and Submit Draft PRAP	45 days	Fri 3/8/13	4/21/13	
19 Navy, Regulatory Review	60 days	Mon 4/22/13	6/20/13	
Response to Comments	10 days	Fri 6/21/13	6/30/13	
21 Prepare and Submit Final PRAP	30 days	Mon 7/1/13	7/30/13	
Public Notice	1 day	Wed 7/31/13	7/31/13	T T
Public Comment/Public Meeting	45 days	Thu 8/1/13	9/14/13	
24 ROD for Site 13	160 days	Mon 7/1/13	12/7/13	
25 Prepare and Submit Draft ROD	30 days	Mon 7/1/13	7/30/13	
Navy, Regulatory Review	60 days	Wed 7/31/13	9/28/13	
Response to Comments	10 days	Sun 9/29/13	10/8/13	
Prepare and Submit Final ROD	30 days	Wed 10/9/13	11/7/13	↓
29 Prepare and Distribute Signed Final ROD			12/7/13	
	·			
Task Project: CTO-110	Milestone	♦	Rolled Up Split External Tasks External Milestone	Deadline
Date: Tue 11/29/11 Split Progre	Summary Rolled Up Task		Rolled Up Milestone \diamondsuit Project Summary External Milestone \diamondsuit Rolled Up Progress External Milestone \diamondsuit External Milestone \diamondsuit	
			Page 1	

Figure 4-6 Administrative Activities Schedule Allegany Ballistics Laboratory ID Task Name Duration Start Finish 1 Administrative Activities Tue 9/3/13 653 days Mon 11/21/11 Land Use Controls Mon 11/21/11 Tue 12/25/12 401 days Site 1, 5, and 10 Remedial Design LUCs Fri 12/30/11 Tue 6/26/12 180 days Prepare and Submit Draft Remedial Design LUCs 90 days Fri 12/30/11 Wed 3/28/12 Fri 4/27/12 Navy, Regulatory Review Thu 3/29/12 30 days Response to Comments Sat 4/28/12 Sat 5/12/12 15 days Prepare and Submit Final Remedial Design LUCs Sun 5/27/12 Sun 5/13/12 15 days Concurrence Letter on Final Remedial Design LUCs Mon 5/28/12 Tue 6/26/12 30 days Sites 11 and 12 Remedial Design LUC 362 days Fri 12/30/11 Tue 12/25/12 Prepare and Submit Draft Sites 11 and 12 Remedial Design LUC Fri 12/30/11 Wed 3/28/12 90 days Fri 4/27/12 Navy, Regulatory Review 30 days Thu 3/29/12 Response to Comments Sat 4/28/12 Sat 5/12/12 15 days Prepare and Submit Final Sites 11 and 12 Remedial Design LUC Sun 5/13/12 Sun 5/27/12 15 days Concurrence Letter on Final Sites 11 and 12 Remedial Design LUC Mon 5/28/12 Tue 6/26/12 30 days Land Use Controls Implementation Plan 182 days Wed 6/27/12 Tue 12/25/12 Prepare and Submit Draft LUC Implementation Plan Mon 9/24/12 Wed 6/27/12 90 days Wed 10/24/12 Navy, Regulatory Review 30 days Tue 9/25/12 Response to Comments 15 days Thu 10/25/12 Thu 11/8/12 Prepare and Submit Final LUC Implementation Plan 17 days Fri 11/9/12 Sun 11/25/12 Concurrence Letter on Final LUC Implementation Plan Tue 12/25/12 30 days Mon 11/26/12 Interim Remedial Action Completion Reports for Site 5 and Site 10 121 days Mon 11/21/11 Tue 3/20/12 Prepare and Submit Draft IRACRs for Site 5 & Site 10 Mon 11/21/11 Mon 12/19/11 29 days Navy, Regulatory Review 30 days Tue 12/20/11 Wed 1/18/12 Response to Comments 15 days Thu 1/19/12 Thu 2/2/12 Prepare and Submit Final IRACR for Site 5 & Site 10 17 days Fri 2/3/12 Sun 2/19/12 Concurrence Letter on Final IRACR for Site 5 & Site 10 Mon 2/20/12 Tue 3/20/12 30 days Site Management Plan 102 days Wed 5/2/12 Sat 8/11/12 Prepare and Submit Draft 2012 Site Management Plan Wed 5/2/12 Thu 5/31/12 30 days Regulatory Review 30 days Fri 6/1/12 Sat 6/30/12 Response to Comments Sun 7/15/12 15 days Sun 7/1/12 Review and Revision of SMP schedules 15 days Mon 7/16/12 Mon 7/30/12 Sat 8/11/12 Prepare and Submit Fiinal 2012 Site Management Plan 12 days Tue 7/31/12 Five Year Reviews 245 days Wed 1/2/13 Tue 9/3/13 Prepare and Submit Draft 5-Year ROD Review Report 30 days Wed 1/2/13 Thu 1/31/13 Navy, Regulatory Review 90 days Fri 2/1/13 Wed 5/1/13 Wed 5/15/13 Response to Comments 14 days Thu 5/2/13 Prepare and Submit Draft-Final 5-Year ROD Review Report 18 days Thu 5/16/13 Sun 6/2/13 Sun 6/30/13 Navy, Regulatory Review 28 days Mon 6/3/13 Response to Comments 5 days Mon 7/1/13 Fri 7/5/13 Prepare and Submit Final 5-Year ROD Review Report Fri 7/19/13 Sat 7/6/13 14 days Signed 5-Year ROD Review Report 15 days Sat 7/20/13 Sat 8/3/13 Regulatory Concurrence leter on 5-Year Review Report Mon 9/2/13 Sun 8/4/13 30 days 5-Year Review Report Public Notice 1 day Tue 9/3/13 Tue 9/3/13 Task Project Summary Deadline Progress Summary Rolled Up Split Rolled Up Progress Project: CTO-110 Date: Tue 11/29/11 Split Milestone Rolled Up Task Rolled Up Milestone ♦ External Tasks External Milestone ♦

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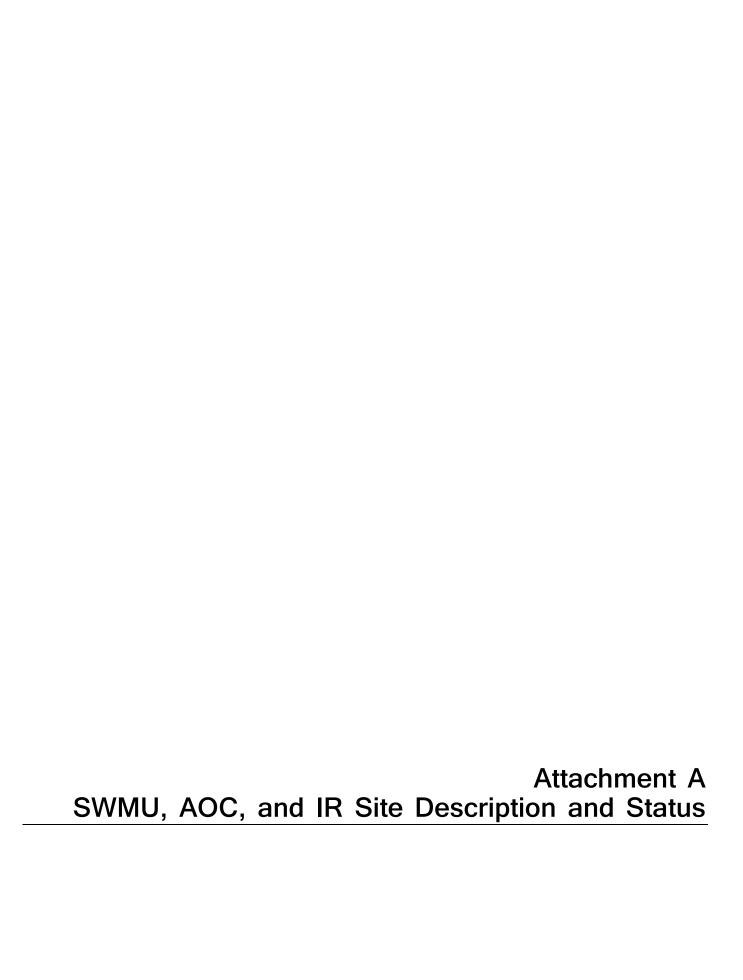
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5-2 ES122011012303VBO



Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	SWMU 1, Former Hazardous Waste Storage Area I (The soil at this SWMU is part of IR Site 1 western end subsite (also includes SWMUs 11, 22C, and 22D))	West of the Current Burning Ground	Late 1970s - 1981	Approximately 360-square-foot pad used for the storage of 55-gallon drums of hazardous waste prior to disposal off site. The unit managed hazardous wastes F001, F002, F003, F005, D001, D002, and F019 including chlorinated solvents, still bottoms, metal plating pretreatment sludge, and waste acids and bases. A pilot study of a fluidized bed incinerator was conducted on the pad during the early 1980s for the disposal of propellants and explosives. Propellants and explosives were tested at the pilot test incinerator; reportedly the only wastes generated were aluminum oxide, aluminum, potassium chloride, and carbon.	Status The RFA recommended no further action for this SWMU. A ROD for Site 1 groundwater remediation was signed in April 1997. Construction of a groundwater treatment plant for treatment of VOCs was completed and has been operational since September 1998. A combined Five Year Review Report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy for groundwater is functioning as intended by the ROD. Anticipated Soil at the SWMU is currently under investigation as part of Site 1. A Final RI was issued in July 2006. A Draft FS was issued in July 2010 and a Draft EE/CA for a removal action in the former disposal pits was issued in June 2011 for regulatory review.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	SWMU 7, Inert Burning Ground	East of the fenced area containing the Current Burning Ground	1958 – 1985	Approximately 20-foot by 20-foot area located outside the fenced area of the current Burning Ground. The unit managed waste materials contaminated with explosives, including explosive contaminated waste rags. These rags may also have been contaminated with solvents including methylene chloride and TCE. Open burning of these wastes was conducted here and the ash was deposited at the unit and in the Inert Landfill (SWMU 9).	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under SWMU 1. Anticipated See discussion under SWMU 1.
Site 1	SWMU 8, Acid Disposal Pits	In the southwestern portion of the fenced area containing the Current Burning Ground	1972 - 1982	Two unlined, crushed-limestone-filled, earthen pits approximately 20 feet by 5 feet in area and 4 feet in depth. Waste acids and bases generated by laboratory operations were poured into the pit and allowed to percolate through the limestone. It is estimated that approximately 1 gallon of acid per month was disposed of at this unit.	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under SWMU 1. Anticipated See discussion under SWMU 1.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 5	SWMU 9, Inert (Non- ordnance) Landfill	South of Plant 2	1964 - 1988	Landfill approximately 420 feet long, 110 feet wide, and 20 feet deep. This unit received empty drums, unknown lab and photographic chemicals, scrap metal and plastic, large quantities of broken fluorescent tubes containing mercury, sandblasting grit, wood products, construction debris, fiberglass, and other resin-coated fibers. The empty drums were formerly used to store chemicals such as methylene chloride, TCE, acetone, and ammonium perchlorate. Chunk metallic lead potentially may have been disposed of here.	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. A ROD was signed for soil and waste remediation on January 1997. Construction of a landfill cap was completed in October 1997. A long-term groundwater monitoring program was implemented at that time and currently is conducted on a tri-quarterly basis.
					A draft Focused RI Report for groundwater, surface water, and sediment was submitted in September 2003. A technical memorandum evaluating the results of the Site 5 MNA study was submitted in January 2004.
					Remedial alternatives for groundwater, surface water, and sediment, as appropriate, are evaluated in the FFS. The RI/FS for Site 5 was completed in September 2004.
					A PRAP and ROD were prepared in 2005 for Site 5 groundwater, surface water, and sediment. Construction of a permeable reactive barrier through the alluvial aquifer was completed in June 2006.
					A combined Five-Year ROD Review report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedies are functioning as intended by the ROD.
					Anticipated Long term monitoring and operations and maintenance activities are ongoing.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 1	SWMU 11, Former Burn Cages and Ash Landfill	Northwest portion of Plant 1 between the fence and North Branch Potomac River	prior to 1970 until the 1970s	Unit consists of an ash landfill and at least two burn cages. The landfill measures approximately 100 feet by 60 feet in area and 12 feet in depth. During the 1960s and 1970s the facility burned paper, cafeteria garbage, packaging materials, and non-explosive materials in open wire mesh cages. The ash generated from the burning was disposed at the landfill located adjacent to the cage areas. The landfill also contains demolition debris, empty solvent drums, and rocket motor casings.	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. See remainder of discussion under SWMU 1. Anticipated See discussion under SWMU 1.
Site 12	SWMU 12, Former Alodine Treatment Tank	Outside of Bldg. 167	1978 – 1982	The unit was a 1,000-gallon, open-top, vertical cylinder. Industrial wastewater from the Alodine process (aluminum surface chemical conversion process) was pretreated at the unit for chromium reduction and precipitation. As of 1980, 4,200 gallons of Alodine process wastewater were treated at this unit on a monthly basis.	Status The RFA recommended no further action for this SWMU. AOC N was part of the Phase I Phase II and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been designated as IR Site 12. No further action is planned for SWMU 12, The ROD for Site 12 was issued for regulatory review in June 2011. Anticipated The remedial action, in-situ bioremediation, is planned for 2012. Performance monitoring and LTM will continue until the remediation goals are achieved.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 12	SWMU 14, Current (no longer in use) Alodine Waste Storage Area I	Bldg. 167	1991 - 1998	Concrete area used to store Alodine waste and Alodine contaminated rags in 55-gallon drums. The unit measures approximately 20 feet by 10 feet.	Status The RFA recommended no further action for this SWMU. The regulatory agencies agreed with this recommendation under the condition that possible releases from this tank be considered in the investigation of SWMU 52. AOC N was part of the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been designated as IR Site 12. No further action is planned for SWMU 14. See discussion under SWMU 12. Anticipated See discussion under SWMU 12.
Site 1	SWMU 20, Solvent Disposal Pit	In the southwestern portion of the fenced area containing the Current Burning Ground	Unknown - 1978	Unlined earthen pit used for the disposal of explosive-contaminated solvents such as TCE, PCE, and 1,1,1-TCA. The wastes were poured into the pit and allowed to percolate into the soil or evaporate; the waste in the pit was then ignited.	Status See discussion under SWMU 1. Anticipated See discussion under SWMU 1.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 11	SWMU 36, Oil Pit	Bldg. 215	1960s – 1995	A below grade circular pit measuring 2 feet in diameter and 2 feet in depth. This unit contained a dark, highly viscous petroleum substance during the RFA site visit. It is assumed that the unit was used as a transfer hose drip catchment.	Status The RFA recommended that the integrity of the oil pit be evaluated, and if impaired, soil sampling should be performed. A 55-gallon drum filled with No. 5 fuel oil and adjacent soils were removed to clean the area. Confirmatory soil samples indicated no contamination. Additional soil samples were collected during the Advanced Site Inspection and the Site 11 RI. A RI for Site 11 was completed in January 2005. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal review.
					<u>Anticipated</u>
					The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
SWMU 37N is part of IR Site 12. Other SWMUs in this series are not associated with an IR site.	SWMU 37, Wastewater Sumps [37A through 37Q, 37S through 37X] SWMU 41 was evaluated with SWMU 37B per FFA.	Buildings. 4 (37A), 7 (37B and BB), 12 (37C), 13 (37D), 15 (37E), 22 (37F), 27 (37G), 32 (37H), 49 (37I), 100 (37J), 103 (37K), 105 (37L), 105A (37M), 167 (37N), 226 (37O), 248 (37P), 256 (37Q), 280 (37S), 11 (37T), 22 (37U), 14 (37V), 8 (37W), 214 (37X)	Various dates from the 1940s – 1999	Currently 23 units have been identified. These units have received or have potentially received contact cooling water from propellant machining operations, building washdown water from structures at which solid explosives are processed, wastewater containing materials other than propellants and explosives, coolants, oil, solvents, Alodine wastewater, salts, sands, and sediment.	Status SWMUs 37B, 37BB, 37C, 37E, 37F, 37G, 37J, 37N, 37T, 37U, 37V, 37W, and 37X were investigated during the Phase I and/or Phase II SWMU/AOC Investigation. SWMU 37N was investigated as part of AOC N. SWMUs 37C, D, E, T and U were removed in June 1998SWMUs 37A, 37B, 37BB, 37N, 37V, and 37X were removed in 2000/2001. SWMUs 37H, 37K, 37M, and 37O were closed out in September 1999 via closeout reports. SWMUs 37C (soil), 37D (soil), 37I, 37L, and 37P were closed out in September 2000 via closeout reports. SWMUs 37C (groundwater), 37F, 37G, and 37S were closed out in September 2001 via closeout reports SWMU 37Q closed out in FFA under findings of fact p. 19. SWMUs 37A and 37X were closed out in February 2002 via closeout reports. SWMUs 37B, 37BB, 37J, 37T, and 37U were closed out in July 2002 via closeout reports. SWMU 37E (soil) was closed out in March 2004 via closeout report. SWMU 37ii and 37V were closed out in 2005. SWMU 37W (soil) was closed in April 2010. In 2011, groundwater in the vicinity of several SWMUs near Building 8 was investigated to assess potential impacts. Results from this investigation will be used to determine if an RI is warranted or if NFA is warranted.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					Anticipated Summary memo of groundwater data with site closeout or recommendations of a full RI. Groundwater area has been consolidated into one unit for investigation referred to as Building 8/Lab Row Area.
Site 12	SWMU 52, Current (no longer in use) Alodine Treatment Tank	South of Bldg. 167	1991 - 1995	A treatment tank which was open on top with a plastic containment structure (6 feet in diameter by 2 feet deep) beneath it. The tank and containment structure were on a concrete pad. This treatment tank operated at the same location as the former Alodine treatment tank (see SWMU 12 description). This unit managed spent Alodine.	Status SWMU 52, part of AOC N, was part of the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been redesignated as IR Site 12. An RI for Site 12 was completed in June 2008. A draft FS for the combined areas of Site 11 and 12 was submitted in August 2008. The Draft Final ROD for Site 12 was issued in June 2011 for regulatory/legal review. Anticipated No further action is planned for SWMU 52. The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 12	AOC N, Building 167 SWMUs	Bldg. 167 Primarily 1970s – present	-	This AOC comprises five SWMUs (12, 14, 24S, 37N, and 52). See specific descriptions under each of these SWMUs.	Status AOC N was investigated during the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based on the findings of the Phase III investigation, AOC N has been designated as IR Site 12, which is under investigation.
					A non-time critical removal action was performed for soil at Site 12 soil in 2005.
				An RI for Site 12 was completed in June 2008. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal review.	
					Anticipated
					The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.
Site 1	IR Site 1 - Northern Riverside Waste Disposal Area	Northern perimeter of Plant 1	Late 1950s – 1960s	See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions.	See SWMUs 1, 6, 7, 8, 11, 20, and 22C and 22D descriptions.
	Includes SWMUs 1, 7, 8, 11, & 20				
Site 2	IR Site 2 - Previous Burning Ground (1942 – 1949) (This IR site is also SWMU 4)	On the north side of I Street southeast of Bldg. 361	1942 – 1949	See SWMU 4 description	See SWMU 4 description

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 5	IR Site 5 - Inert Landfill (This IR site is also SWMU 9)	South of Plant 1	1964 – 1988	See SWMU 9 description	See SWMU 9 description
Site 10	IR Site 10 – Former TCE Still and Production Well A (PWA)	Near Bldg. 157	1959 – early 1960s	A TCE groundwater plume has been detected near Building 157. The source is believed to be a former still which operated adjacent to Building 157.	Soil and groundwater at this SWMU have been investigated during the RI; Phase II RI; Phase I and II Aquifer Testing; and 2001 supplemental soil investigation. An interim ROD was signed for groundwater remediation in August 1998. Construction of a groundwater treatment plant was completed and has been operational since September 30, 1998. Groundwater extraction at Site 10 began in February 1999. The groundwater extraction system was modified in February 2003 based on results of the Phase III Aquifer Testing to include an additional alluvial extraction well and four bedrock extraction wells. A Final ROD for Site 10 groundwater was signed in 2005. A Groundwater extraction and treatment system is currently being operated and maintained. A Final NFA ROD for Site 10 soil was signed in 2007. A combined Five-Year ROD Review report for Sites 1, 5, and 10 was completed in September 2008 and showed that the remedy is functioning as intended by the ROD. Anticipated Long term monitoring and operations and

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 11	IR Site 11 - Building 215 (Production Well F)	Eastern portion of Plant 1; north of Buildings. 421 and 438.	1961	This site is the area surrounding and including a 8-inch-diameter water supply well that was never put into production because of sand accumulation. The well was uncovered during demolition of Building 215. Petroleum hydrocarbons and solvents have been found in the well.	Status The RI activities, including a year of quarterly sampling, have been completed. The anticipated source of contamination (i.e., DNAPL) has been removed from F-Well. A Final RI Report for Site 11 was completed in January 2005. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal review. Anticipated The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 12	IR Site 12 – Building 167 SWMUs (This IR site was formally known as AOC N, which includes SWMUs 12, 14, 24S, 37N and 52)	Outside of Bldg. 167	1978 – 1982	This site comprises five SWMUs (12, 14, 24S, 37N, and 52). See specific descriptions under each of these SWMUs.	Status Field investigations were initiated in 2003 as part of an RI designed to address data gaps identified following the Phase III SWMU/AOC Investigation of AOC N. Ongoing RI activities at Site 12 are evaluating the nature and extent of groundwater contamination in the alluvial and bedrock aquifers. A non-time critical removal action was performed for soil at Site 12 soil in 2005. An RI for Site 12 was completed in June 2008. A FS for the combined areas of Site 11 and 12 was completed in 2010. The Draft Final ROD was issued in June 2011 for regulatory/legal review. Anticipated The ROD is expected to be finalized by September 2011. The remedy will be implemented in 2012. Performance monitoring and LTM of groundwater will continue until the remediation goals are achieved.

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER CERCLA INVESTIGATION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 13	Range Road Area	Near Range Road–H Street Intersection	1952	No reports regarding wastes managed, but boiler operations at Former Buiding106A may be the source of contamination in groundwater	Status Phase I through IV soil, groundwater, sediment investigation activities were conducted at the Site. Anticipated source is no longer present (former boiler building) Pilot Study was implemented in 2004 with in-situ bioremediation to treat the groundwater near the former boiler. Subsequent groundwater delineation activities have been conducted to characterize the nature and extent of contamination. Currently an RI for all media (soil, groundwater, surface water, and sediment is ongoing). Anticipated Complete the RI in 2011; FS in 2012 to evaluate remedial alternatives.

Notes:

ABL = Allegany Ballistics Laboratory 1.1.1-TCA = 1.1.1-trichloroethane

TCE = Trichloroethene

HMX = Octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7,-tetrazocine

RDX = Hexahydro-1, 3, 5-trinitro-1, 3, 5-triazine

PCE = Tetrachloroethene

PCB = Polychlorinated Biphenyl

MEK = Methyl Ethyl Ketone

MIBK = Methyl Isobutyl Ketone

TCL = Target Compound List

VOC = Volatile Organic Compound

NA = Not Available NG = Nitroglycerin

NC = Nitrocellulose

AP = Ammonium perchlorate

 $RFA = RCRA \ Facility \ Assessment$

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

TPH = Total Petroleum Hydrocarbon

ppb = Parts per billion
ppm = Parts per million

UST = Underground Storage Tank RFI = RCRA Facility Investigation

ROD = Record of Decision

RBC = Risk-Based Concentration

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 2, Former Hazardous Waste Storage Area II	Southern portion of Plant 1, adjacent to Bldg. 360	1981 - June 1990	Approximately 40-foot by 100-foot concrete pad designed to manage drums of waste from satellite accumulation areas throughout the plant prior to being shipped off site. Typical wastes managed included: still bottoms (F001, F002), paint removers (F001, F002, F003, F005), paint related materials (D001, F001, F002, F003, F005), chromium containing wastes (D007), lead containing wastes (D008), and corrosive waste (D002).	Status SWMU 2 was closed out in November 2004 via closeout report. A deed notation was issued in 2005 indicating that SWMU 2 was formerly used as a hazardous waste storage area. Anticipated None.
NA	SWMU 3, Current Hazardous Waste Storage Area	Bldg. 366	June 1990 – present	Concrete pad consisting of 40 individually diked and recessed concrete cells (maximum capacity 300 55-gallon drums) for the storage of hazardous wastes. Wastes include: still bottoms (F001, F002), paint removers (F001, F002, F003, F005), paint-related materials (D001, F001, F002, F003, F005), corrosive waste (D002), chromium-containing waste (D007), lead-containing waste (D008), ash from Burning Grounds. In addition, spent solvents, waste motor oil, coolant, antifreeze, cured and uncured resin, waste alcohol, asbestos, waste silver, Alodine solids, and PCB-contaminated materials are also managed in this unit.	Status The RFA recommended no further action for this SWMU. This pad is permitted and managed under RCRA. Anticipated Hazardous waste management permit renewal and continued operation.

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 27A, Plant 1 Drainage Ditch System (Includes SWMU 39)	Throughout the facility	1940s - present	A stormwater drainage system of open earthen drainage ditches, catch basins, and culverts throughout the facility. This system also receives washdown from some of the process buildings (e.g. Bldg. 181) and discharge from the settling basin (SWMU 44, which was removed in 1993).	Status The RFA recommended collecting samples at certain points in the drainage ditch. Additional Plant 1sediment and surface water samples and background samples were collected in 2002 and 2003 as part of the Phase III SWMU/AOC Investigations. In 2004, soil samples were collected adjacent to SWMU 27A at the Range Road Area to identify potential sources of chlorinated VOCs in alluvial groundwater. Five alluvial monitoring wells were installed at the Range Road Area. Additional sediment samples were collected in 2005 from SWMU 27A to further characterize this area. A Pilot study was also conducted in 2005 adjacent to SWMU 27A at the Range Road Area to evaluate methods to encourage microbial degradation of VOCs in groundwater. SWMU 27A was closed out in December 2006 via closeout report. In 2008 USEPA identified the Range Road Area of SWMU 27A as Site 13, Operable Unit 15. Anticipated SWMU 27A is currently regulated under the facility RCRA permit. The Range Road Area of SWMU 27A will be continue to be addressed under CERCLA as Site 13 (Operable Unit 15).

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 34A and B, Oil/Water Separators for air compressors	Bldg. 252 (34A) and 341 (34B)	1991 and 1992 – 2001	Five units located in Buildings 215 (two units), 252, 300, and 341. The primary waste managed by these units is waste lubricating oil from air compressors. The units separate the water from the oil and discharge the water through floor drains to the wastewater treatment plant (SWMU 16).	Status These SWMUs were part of the Phase II SWMU/AOC Investigation. Screening of the data suggest there were TPH levels in the soil and groundwater that required additional evaluation. The air compressor buildings associated with these SWMUs were demolished in 2003. A soil removal action was completed at each SWMU in 2007 as part of the RCRA Corrective Action program by ATK. Groundwater at each SWMU is currently being evaluated. Anticipated SWMUs 34A and 34B are being addressed under RCRA corrective action. Soil removal actions have been completed at these SWMUS, no further action is anticipated for soil, Additional groundwater data is currently being collected for evaluation.
NA	AOC G, X Range Area	Undeveloped test area east of Plant 1	1944 - present	Area is a static test firing range for rocket motors and igniters that are produced at ABL. This unit manages explosive residuals, which are generated as a result of the rocket motor and igniter testing procedures. Propellants may contain AP, aluminum, NG, nitrate esters, NC, RDX, and HMX as primary ingredients. Firing has lead to erosion of the hillside, and residues from fired materials may have reached the soil. Occasionally, rocket motors being tested explode; burning propellant and motor parts are discharged onto the hillside generating small fires.	Status The RFA recommended that soil samples be collected in the vicinity of test firing bays at Buildings 77, 193, 194, and 242. Anticipated The unit is still in operation. Investigations are anticipated per the requirements of the RCRA subpart B permit.

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS for AREAS UNDER RCRA CORRECTIVE ACTION ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 6	AOC I, Sensitivity Test Area and Pond	500 Area	1970s	The sensitivity test area is located approximately 100 feet up-slope of the pond. Since 1989, .50-caliber bullet impact testing and flammability testing of rocket motors have been conducted in this area. This unit includes a pond, which serves as a catch basin for runoff from the sensitivity area. The unit manages explosive residuals transported by stormwater runoff from this area. Water from this pond would flow via tributaries to the North Branch Potomac River. RDX and other explosive constituents were detected in surface water samples.	A portion of AOC I (Site 6, the pond) was closed out in February 2002 via closeout report. Anticipated Investigations of this unit are anticipated per the requirements of the RCRA Corrective Action permit.
NA	AOC S, Fenced Westernmost Sensitivity Test Area (formerly a portion of AOC I)	500 Area	Late 1980s – 2002	AOC S, the sensitivity test area, is located on the hillside about 100 feet west of the Site 6 pond. The area was used for .50-caliber bullet impact testing and flammability testing of rocket motors.	Anticipated Investigations of this unit are anticipated per the requirements of the RCRA Corrective Action permit.
Site 6	IR Site 6 - Sensitivity Test Area Surface Water Impoundment (This IR site is part of AOC I)	500 Area	1970s	See AOC I description	See AOC I description

Notes:

ABL = Allegany Ballistics Laboratory

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TCE = Trichloroethene

HMX = Octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7,-tetrazocine

RDX = Hexahydro-1, 3, 5-trinitro-1, 3, 5-triazine

PCE = Tetrachloroethene

PCB = Polychlorinated Biphenyl MEK = Methyl Ethyl Ketone

MIBK = Methyl Isobutyl Ketone

TCL = Target Compound List

VOC = Volatile Organic Compound

NA = Not Available NG = Nitroglycerin

NC = Nitrocellulose

AP = Ammonium perchlorate

RFA = RCRA Facility Assessment

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

TPH = Total Petroleum Hydrocarbon

ppb = Parts per billion
ppm = Parts per million

UST = Underground Storage Tank

RFI = RCRA Facility Investigation

ROD = Record of Decision

RBC = Risk-Based Concentration

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 2	SWMU 4, Former Burning Ground I	On the north side of I Street; southeast of Bldg. 361	1942 – 1949	A former burning ground of approximately 20 feet by 40 feet (gravel covered surface), used for burning waste propellant components and explosives. The exact location and configuration of the burning ground and details of the material burned there are not known. It is assumed that approximately 50 pounds of waste materials per day are estimated to have been burned.	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. A final Risk Assessment Report for Sites 2, 3, and 10 was submitted in 2005. A NFA PRAP was prepared in 2006 and an NFA ROD was issued in July 2008.
Site 3	SWMU 5, Former Burning Ground II	West side of Bldg. 362	1950 - 1958	A former burning ground of approximately 40 feet by 200 feet (clay covered surface), used for burning reactive wastes consisting of propellants and explosives. At least a portion of the former burning ground is covered by Building 362. It is assumed that approximately 200 pounds of waste materials per day are estimated to have been burned.	Status The RFA recommended an RFI for this SWMU and that the RFI be coordinated with the ongoing activities of the RI. A final Risk Assessment Report for Sites 2, 3, and 10 was submitted in 2005. A NFA PRAP was prepared in 2006. A NFA ROD for Site 3 was signed in 2007.
Site 7	SWMU 10, Beryllium Landfill	Adjacent to Route 956, southwest of Bldg. 300, the main administratio n building	1964 – late 1960s	Earthen pit measuring approximately 10 feet by 10 feet in area and 6 feet in depth. A maximum of two pounds of beryllium and 100 pounds of excess lab chemicals were disposed of here. Reportedly, the unit contained several hundred pounds of beryllium-contaminated wiping tissues, gloves, and sample containers. Glassware from the labs was also disposed of at this unit.	Status Soil removal at this site/SWMU was completed under the IR Program in 1994, with final disposition of the wastes in March 1997. A streamlined RI/FS report and PRAP were submitted in June 2001 and a public meeting was held in July 2001. A No Further Action ROD was signed in September 2001.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 16, Plant 1 Wastewater Treatment System	Bldg. 294	1962 - December 1996	Wastewater treatment plant which treated all of the facility's sanitary wastewater along with some industrial wastes from photographic processing and several chemical laboratories. Approximately 1,500 gallons per month of filtered wastewater containing residual RDX (less than 100 mg/l), pre-treated wastewater from the Alodine process, and some water from oil/water separators was discharged to this unit. Also, a portion of the facility's stormwater sewer system was routed to this unit from 1970 until 1984.	Status The RFA recommended that soil samples be collected in the overflow area. These samples were collected during the Phase II RI. The analytical results indicated that no analytes were detected above the EPA Region III RBC values. Confirmatory soil samples were collected from beneath the treatment plant when it was demolished in May 1998. The data suggested that releases did not occur beneath the treatment plant. Anticipated
					Based on the information above, no further action is planned for this SWMU.
Site 4B	SWMU 18, Photo Solution Discharge Area I	Adjacent to Bldg. 181	1959 - 1971	An unlined drainage ditch which received discharges of spent photographic and x-ray solutions from developing and processing operations. These solutions likely contained silver, cyanide, and phenol.	Surface soil samples were collected during a supplementary investigation in 2001. These data, together with historical and background data, were used to calculate PRGs for soil constituents at the Site. In November 2003, a soil removal pilot study removed the majority of the impacted soil at the site. Additional excavation and confirmatory sampling was completed in 2004. A pilot study report for Site4B was issued in 2005. A NFA PRAP was prepared in 2007.
					Anticipated A NFA ROD was signed for Site 4B in 2007.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 4A	SWMU 19, Photo Solution Discharge Area II	Adjacent to Bldg. 231	1959 - 1965	Originally thought to have been a shallow gravel-lined pit (french drain) which received spent photographic and x-ray solutions from developing and processing operations. This SWMU was later determined not to have received any of these wastes.	Status The RFA recommended that soil samples be collected around the unit at Building 231. Possible releases from this area have been considered in the investigation of SWMU 26. The building drainage was always connected to the sewage treatment plant and soil testing has confirmed no release. The SWMU was closed out in FFA under Findings of Fact p 19.
NA	SWMU 21, Building 241 Catch Basin	Bldg. 241	1960s - 1980s	The unit managed water, which may have contained residual explosive materials from testing operations in the Building 241 bunker. The unit is a metal catch basin, the bottom and sides of which consisted of a fine screen which filtered the particulate residue and allowed water to pass through.	Status SWMU 21 was closed out in August 2001 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 22, Incinerators SWMU 22A – Explosive Waste Incinerator SWMU 22B - Classified Document Incinerator SWMU 22C - Pilot Fluidized Bed Incinerator SWMU 22D - Non-Explosive Combustible Incinerator (SWMUs 22C and 22D are part of IR Site 1, SWMU 22D is also SWMU 11)	SWMU 22A is located in the south central portion of Plant 1. SWMU 22B is west of Bldg. 385 in the northeast portion of Plant 1 SWMUS 22C and 22D are in the northwest portion of Plant 1	1942 - 1980s	Comprises an explosive waste incinerator (1942 - 1950s) which treated explosive wastes; classified document incinerator (1942 - 1980s) for scrap paper; pilot fluidized bed incinerator (1980s) for specially prepared propellant and explosive material; and non-explosive combustible incinerator (1960s - 1970s) for facility refuse and non-explosive combustible materials.	Status SWMU 22 (22A, 22B, 22C, and 22D) was closed out in September 2000 via closeout reports.
NA	SWMU 23, Salvage Yard	East of Bldg. 270	1950s - present	Unit managed scrap metals including aluminum and copper, also stored outdated equipment such as compressors, empty drums, and, at one point, spent automotive batteries. In the mid-1990s the western half of this SWMU was deactivated and a building was constructed in that area.	Status SWMU 23 was closed out in September 2000 via closeout report.
SWMU 24S is Part of Site 12; Other SWMUs in this series are not associated with an IR site.	SWMU 24, Satellite Accumulation Areas [24A through 24BB]	Throughout the facility	1940s - present	Several areas throughout the facility used to accumulate waste materials before they are transferred to the current hazardous waste storage area (SWMU 3).	Status SWMU 24G was deleted during the RFA. Based on the October 22, 1997 and the October 14, 1998 agency meetings, no further action was planned for SWMUs 24A, 24B, 24C, 24D, 24F, 24H, 24J through 24Q, 24U, 24W, 24Y, 24Z, 24AA, and 24BB. Further action is planned for SWMU 24S under AOC N (See discussion under SWMU 12).

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
					SWMUs 24J and 24V were closed out in September 2000 via closeout reports.
					SWMUs 24A, 24B, 24C, 24D, 24E, 24F, 24H, 24I, 24K, 24L, 24M, 24N, 24O, 24P, 24Q, 24R, 24T, 24U, 24X, 24Y, 24Z, 24AA, and 24BB were closed out in February 2002 via closeout reports.
					SWMU 24W was closed out in July 2002 via closeout report
					AOC N was part of the Phase I, Phase II, and Phase III SWMU/AOC investigations. Based upon the results of the Phase III, AOC N has been redesignated as IR Site 12.
					Anticipated
					No further action is planned for SWMU 24S, but further investigation at IR Site 12 (see further details under SWMU 12).
NA	SWMU 25, Solvent Recovery Stills [25A, 25B, and 25C]	Bldg. 8 (25A), Bldg. 167 (25B), and Bldg. 256 (25C)	Various start-up dates from 1970s – mid- 1990s	Three solvent recovery stills located inside buildings 8 (25A), 167 (25B), and 256 (25C). All SWMUs managed methylene chloride still bottoms.	SWMU 25 (25A, 25B, and 25C) was closed out in February 2002 via closeout report.
NA	SWMU 26, Septic Tank	South of Bldg. 369	1940s - 1960s	Unit managed primarily sanitary wastewater, but did manage some industrial wastewater. Industrial wastewater was generated from photographic processes and lab glassware washing. Industrial wastewater potentially contained organic constituents, including acetone and photographic solutions.	Status The contents of the septic tank were characterized, removed, and disposed of as non-hazardous and the tank was closed in place by filling with inert material in 2001. SWMU 26 was closed out in July 2002 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 28, Silver Recovery Units	Buildings. 181 and 300	Bldg. 181, 1971 - present Bldg. 300, 1960s - mid-1990s	Two units that are used to reclaim silver from photographic and x-ray development waste. Once the silver is precipitated, the wastewater is discharged to the plant wastewater treatment system (i.e., SWMU 16).	Status SWMU 28 was closed out in February 2002 via closeout report.
NA	SWMU 29, Dust Collectors and Baghouses [29A through 29K]	Buildings. 2 (29A), 8 (29B), 35 (29C), 36 (29D), 145 (29E), 167 (29F), 256 (29G and 29H), 262 (29I), 300 (29J), and 344 (29K)	Various start-up dates from 1955 - present	Comprises dust collection systems to collect material from grit blasting, grinding, and sanding. The material collected consisted primarily of metal grindings and sawdust. Boiler fly ash is collected in the SWMU 29K baghouse. RDX and HMX product are collected in the SWMU 29I baghouse and used for propellant manufacture.	SWMU 29 (29A through 29K) was closed out in February 2002 via closeout report.
NA	SWMU 30, Spray Booth Filters	Buildings 8, 167, and 361.	Between 1978 and 1991 - 1995	The facility operates several paint and coating spray booths for painting and lining rocket motor cases, wooden signs, and other components. According the waste profiles, paint wastes contain paint resins, enamels, epoxides, and urethanes. In addition, MEK, MIBK, xylenes, toluene, petroleum distillates, 1,1,1-TCA, and TCE are present in these wastes.	Status SWMU 30 was closed out in February 2002 via closeout report.
NA	SWMU 32, PCB Rags Storage Area	Bldg. 23	1970s - 1980s	An accumulation area measuring approximately 10 feet by 7 feet. The area was located on the 2 nd floor of Building 23 and fully enclosed by wooden plank walls and floor. The unit managed one drum of PCB-contaminated rags and one drum containing a PCB capacitor. In addition, a drum containing PCB fluid used for topping off electrical equipment was stored here.	Status SWMU 32 was closed out in February 2002 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 33, Dumpsters	Throughout the facility	1988 - present	Leased side-loading and top roll-off dumpsters that receive non-hazardous general refuse, including kitchen refuse, paper refuse, non-hazardous cured resin and composite materials, shop waste, waste tires, and non-hazardous ash from burning activities. Spray Booth filters are also disposed in these units.	Status SWMU 33 was closed out in February 2002 via closeout report.
NA	SWMU 35, Paper Mulcher Waste Accumulation Area	Bldg. 1	1983 – 1998	A temporary storage area for paper mulch generated by the facility's SEM Security Disintegrator machine. The unit manages paper mulch generated from classified documents and scrap paper.	SWMU 35 was closed out in February 2002 via closeout report.
NA	SWMU 38, Parts Cleaners	Buildings. 7, 145, 224, and SWMU 24	Various dates from the 1960s - present	Approximately 5-gallon capacity units used to degrease and clean tools and small metal parts. Solvents used in the cleaning process include 1,1,1-TCA and Varsol solvent.	SWMU 38 was closed out in February 2002 via closeout report.
NA	SWMU 39, Weir	Near Bldg. 344	1988 - present	A concrete skimmer located along a part of the drainage ditch system (SWMU 27A). This unit was constructed as a contingency measure in the event of a fuel oil release from a boiler at Building 344.	Status The RFA recommended that soil samples be collected around and upstream of the unit. Because these weirs are part of the drainage ditch system on Plant 1, they are associated with SWMU 27A. Anticipated See discussion under SWMU 27A.
NA	SWMU 40, Laboratory Exhaust Filter	Bldg. 12	1960s (possibly as early as 1940s) – 1998	Disposable filter mechanism located outside of the Strand Bomb Testing Laboratory. It was approximately 18 inches above ground surface, and the majority of the surrounding ground surface was covered with cement. This unit managed combustion products from propellant testing.	Status SWMU 40 was removed June 1998. The SWMU was included in the Phase II SWMU/AOC Investigation. Screening of the confirmatory data suggested the remaining constituent concentrations do not exceed applicable regulatory screening criteria. Therefore SWMU 40 was closed out in July 2002 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 41, Automotive Maintenance Area Drain	Bldg. 7	1940s – 1998	Below grade collection drain located at Building 7. This unit managed washdown water and liquids from inside the building. Waste oil, coolants, and solvents are used regularly in this area.	Status SWMU 41 was closed out in February 2002 via closeout report
NA	SWMU 42 is now listed as AOC F	See AOC F	See AOC F	See AOC F	See AOC F
NA	SWMU 43, Soil Pile	Bldg. 7	1992	Soil was excavated from the area behind Building 7 in 1992 when seven USTs were removed. The soil was land farmed on a plastic liner in an open area east of Building 7. The soil was reportedly contaminated with diesel and gasoline fuel components from the UST cleanup operations.	Status SWMU 43 was closed out in February 2002 via closeout report.
NA	SWMU 44, Settling Basin	Bldg. 7	1992	When the USTs and surrounding soil were removed from behind Building 7, the excavation pits filled with water. Air stripping was conducted on the water and then the water was pumped to a manmade basin 300 feet north of the former tank area. Here, solids were allowed to settle and water then discharged to the drainage ditch system (SWMU 27A).	Status The RFA recommended water samples be collected at this SWMU. Effluent water samples were collected and evaluated. The WVDEP branch overseeing the activities at this SWMU agreed that no further action was necessary. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 45, Air Stripper	Bldg. 7	1992	An air stripper was temporarily installed in the excavation pits behind Bldg. 7 (see SWMU 43 and 44 description). The unit received water from the excavation area with a TPH content of less than 10 ppb. The unit was a fully contained, enclosed, above-ground structure.	Status SWMU 45 was closed out in February 2002 via closeout report.
NA	SWMU 46 is now listed as AOC G	See AOC G	See AOC G	See AOC G	See AOC G

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 47 is now listed as AOC H	See AOC H	See AOC H	See AOC H	See AOC H
NA	SWMU 48 is now listed as AOC I	See AOC I	See AOC I	See AOC I	See AOC I
NA	SWMU 49 is now listed as AOC J	See AOC J	See AOC J	See AOC J	See AOC J
NA	SWMU 50 is now listed as AOC K	See AOC K	See AOC K	See AOC K	See AOC K
NA	SWMU 51 is now listed as AOC L	See AOC L	See AOC L	See AOC L	See AOC L
NA	SWMU 53, Former PCB Storage Area	Bldg. 25	1980s - 1990	Fully enclosed wooden shed with a concrete base. 55-gallon drums of PCB material and hydraulic equipment units, which contained PCB oil, were stored at this unit.	SWMU 53 was closed out in February 2002 via closeout report.
NA	SWMU 54, Building 7 UST Removal Site	Bldg. 7	1950s - 1992	Former location of seven USTs which held gasoline and diesel. These tanks were removed as part of the facility UST removal program in 1992. This unit was found to contain contaminated soil and water (BTEX associated with gasoline and diesel fuel oil from the former tanks). This SWMU is associated with SWMUs 43, 44, and 45.	Status SWMU 54 was closed out in February 2002 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 55, Building 2 UST Removal Site	Bldg. 2	1946 - 1991	Former location of two 550-gallon USTs, which were used to store heating oil. These tanks were removed as part of the facility UST removal program in 1991. This unit was found to contain contaminated soil (TPH associated with the heating oil from the former tanks). The contaminated soil was removed and thermally treated to remove the petroleum contamination.	Status The RFA recommended that an RFI be conducted to assess the nature and extent of contamination. A data package including documentation of pre-removal sampling, the removal action taken, confirmatory sampling, and groundwater monitoring was provided to WVDEP and reviewed. The tanks were not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP and verbal authorization was given to close the excavation. Confirmatory soil sample results were evaluated. Based on the data, the agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA
NA	SWMU 56, Building 3 UST Removal Site	Bldg. 3	1966 - 1991	Former location of four USTs, which were used to store No. 5 fuel, oil. These tanks were removed as part of the facility UST removal program in 1991. This unit was found to contain contaminated soil from No. 5 fuel oil spill from the former tanks (TPH levels less than 50 ppm). The contaminated soil was removed and thermally treated to remove the petroleum contamination.	Status The RFA recommended that an RFI be conducted to assess the nature and extent of contamination. A data package including confirmatory sampling was provided to WVDEP and reviewed. The tanks were not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP and verbal authorization was given to close the excavation providing that a groundwater monitoring well was installed in the excavation of Tank 3-1. The well was installed and sampled. The groundwater results were reviewed. Based on the data, the agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA findings of fact, p. 19.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU 57, Building 300 UST Removal Site	Bldg. 300	1964 - 1991	Former location of one 15,000-gallon UST which was used to store No. 5 fuel oil. This tank was removed as part of the facility UST removal program in 1991. This unit was found to contain soil with less than 100 ppm TPH.	Status The RFA recommended that an RFI be conducted to assess the nature and extent of contamination. A data package including confirmatory sampling was provided to WVDEP and reviewed. The tank was not regulated, so no formal reporting of the removal effort was required. The work was monitored by the WVDEP. The agencies agreed that no further actions were necessary for this SWMU. This SWMU was closed out under FFA findings of fact, p. 19.
NA	SWMU 58, Building 2 PCB	Bldg. 2	Unknown	A PCB spill was reported from hydraulics	Status
	Spill Area			associated with a large hydraulic press, which had once operated in the building.	SWMU 58 was closed out in February 2002 via closeout report.
NA	SWMU 59, Building 3 Drain	Bldg. 3	Unknown	Unknown	<u>Status</u>
					SWMU 59 was closed out in February 2002 via closeout report.
NA	SWMU 60, Building 23 Pesticide Storage Area	Bldg. 23	Unknown	Storage area used by a former maintenance supervisor to store tools. Two pesticide spray pump canisters were observed in the area. According to the former maintenance supervisor, the canisters were old fire extinguishers obtained when the fire department disallowed the use of carbon tetrachloride. The extinguishers were filled with methylene chloride and used to remove wasps from work areas. He stated that pesticides were never stored in this area.	Status SWMU 60 was closed out in February 2002 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	SWMU CCT, Condensate Catch Tank	Former Large Motor Manufacturin g Bldg.	1958 - 1963	SWMU CCT was the condensate collection sump for the steam lines associated with the former Large Motor Manufacturing Building that exploded in 1963.	SWMU CCT was removed in 2001 and was closed out in February 2002 via closeout report.
NA	AOC A, Underground Storage Tanks	Several locations in Plant 1	1960s – 1980s	This AOC comprises 14 USTs that were used to store primarily fuel oil. One 1,000-gallon tank adjacent to Bldg. 100 was used to store heptane during experiments conducted in 1972 and 1973. Several of the USTs have been removed and/or closed in place. Seven USTs remain in service; six of these tanks are regulated.	Status AOC A was closed out in February 2002 via closeout report.
NA	AOC B, PCB Transformers Storage Area	East of Bldg. 157	Unknown - 1991 and 1992	Concrete pad measuring approximately 20 feet by 30 feet. This unit served as a staging area for transformers which were designated for reuse at the facility. The transformers contained PCBs. All transformers were removed from the area in 1991 and 1992.	Status AOC B (SWMU 10002) was closed out in September 2000 via closeout report.
NA	AOC C, Condensate Discharge Area	East of Bldg. 105	Present during RFA site visit (1993)	An earthen area, partially vegetated, which measures approximately 4 feet by 5 feet. A pipe extending from Building 105 discharges warm water with a high iron oxide content.	Status The RFA recommended that soil samples be collected from around the unit. The analytical data from these samples indicated that the condensate comes from steam generated in the boilers at Building 344. The agencies agreed that no further actions are required at this AOC because the condensate discharge will be regulated as Class 5 injection wells or under the NPDES for the facility. This AOC was closed out under FFA findings of fact, p. 20.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	AOC D, Building 181 Pit	Adjacent to Bldg. 181	Present during RFA site visit (1993)	Round, vertical, below-grade terracotta pipe located near Building 181, which appeared to be a possible discharge outlet. There was no historical information regarding this unit, but it is believed to be part of the facility's drainage system.	Status The RFA recommended that the integrity of the pit be tested, and if unsound, soil samples be collected around the pit. Documentation and visual inspection of the "pit" by the agencies determined that the "pit" was a manhole for a sewer line to a nowabandoned septic tank and no cracks or evidence of leaking was observed. Therefore, the agencies agreed that no further action was required for this AOC providing that the septic tank and drainage field be included as part of the facility septic tank investigation. This AOC was closed out under FFA findings of fact, p. 20.
NA	AOC E, Above Ground Storage Tanks Spills Area	Bldg. 344	Present during RFA site visit (1993)	These above-ground storage tanks are surrounded by concrete berm that extends 4 feet above ground and 3 feet below ground. During an EPA inspection, an oil spill was noted within the bermed area. During the RFA site visit, standing water, believed to be condensate discharge, was observed within the bermed area.	Status The RFA suggested that a sampling and monitoring program be implemented. ABL has already completed work (with EPA Region III concurrence) to remove contamination from the area. For this reason, the agencies have agreed that no further action is required for this AOC. This SWMU was closed out under FFA findings of fact, p. 20.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 9	AOC F, Acid Neutralization Pit	Near Bldg. 344	1970s - 1992 (however, not used until 1988)	Served as a contingency discharge area for sulfuric acid from a nearby storage tank. In August 1992, the facility replaced the sulfuric acid tank with a self-contained tank; during the replacement operation, a release of approximately 600 gallons of sulfuric acid occurred. The release was neutralized and reported to the National Response Center. The pit was backfilled in late 1992 and no contamination was found.	Status The RFA recommended that soil samples be collected from the pit area and between the pit area and the drainage ditch. Following the collection of samples and an inspection by the WVDEP, the agencies agreed that no further action was required for this AOC. This SWMU was closed out under FFA findings of fact, p. 20.
NA	AOC H, Centrifuge	Undeveloped test area east of Plant 1. Former Bldg. 78	Unknown – 1998	The centrifuge was a circular structure with concrete walls and floor. The centrifuge was used for test firing of rocket motors. The centrifuge was driven by hydraulic pumps that were in turn driven by a diesel motor. For each test, the motor was carried into the centrifuge using a forklift. Once the centrifuge was activated, the motor was fired and performance data were collected. Periodically, a motor would explode, but the majority of the explosion was contained within the centrifuge. Following an explosion, remains that were dispersed outside the unit were collected for evaluation purposes and disposed of elsewhere. The centrifuge and motor house were demolished in December 1998.	Status AOC H was closed out in February 2002 via closeout report.
NA	AOC J, A and B Ranges	Adjacent to Bldg. 3	1940s - 1970s	This unit consists of two subscale rocket motor static test firing ranges. These ranges likely received propellant residue as a result of rocket motor test firing operations.	Status SWMU 49/AOC J (SWMU 10006) was closed out in September 2000 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	AOC K, C Range	Current location of Bldg. 4	1940s	This unit was used for test firing of .50-caliber machine gun ammunition during World War II. Bullets were fired into a sand filled backstop (Building 43) during testing operations. The composition of the bullets is not known. The facility stated that it must be assumed that all projectiles hit a backstop and were contained. Sand from this backstop has been removed and its disposition is not known. Excavations in the area have not shown evidence of projectiles as were found in connection with H Range. The area is now partially paved with the remainder of the area vegetated.	Status The material in the AOC has been removed and the AOC was closed out in September 1999 via closeout report.
NA	AOC L, H Range	North of Bldg. 275	1940s	The unit is believed to have been used as a mortar testing range during World War II. The ballistics characteristics of mortar propellant were tested by firing the materials toward the hillside. This range potentially received propellant and explosive constituents during testing operations.	Status AOC L was closed out in September 1999 via closeout report.
NA	AOC M, Debris Landfills	Along northern perimeter of Plant 1	Unknown	This AOC comprises three areas along the northern perimeter of Plant 1 where debris from demolished, exploded buildings and fired rocket hardware have been placed.	Soil sampling was conducted at AOC M in October 2001. The data are being evaluated to determine whether the AOC can be closed with no further action.
NA	AOC O, Impact Area for Ranges F, G, and H	Hillside at eastern end of Plant 1	mid-1940s	AOC O is the hillside at the eastern end of Plant 1 to where mortars and other munitions were fired. The area is now completely vegetated and bears no readily observable evidence of mortar impact. According to historical information, no explosive warheads were used at F, G, and H Ranges. However, no release controls were associated with the units. Several concrete-filled mortar shells were unearthed in 1991 during construction and found to be inert.	Status AOC O was closed out in July 2001 via closeout report.

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
NA	AOC P, Former ground Scar Area	North of former Building 294	Unknown	During the 1992 Aerial Photographic Site Analysis (APSA) EPA identified a probable burn area located about 500 feet northwest of Site 2 which has been identified as AOC P. Based on the results of the APSA, soil sampling was conducted in this area. AOC P was added to Appendix B of the FFA in April 2002.	Status AOC P was closed out in 2005 via closeout report.
NA	AOC Q, Former Solvent Shed	Near Building 805	Unknown	AOC Q has been identified as the former solvent storage shed area. AOC Q was added to Appendix B of the FFA in April 2002.	Status AOC Q was closed out in 2005 via closeout report.
NA	AOC R, Former Solvent Shed	Near Building 151	Unknown	AOC R has been identified as the former solvent storage shed area. AOC R was added to Appendix B of the FFA in April 2002.	Status AOC R was closed out in 2007 via closeout report.
Site 3	IR Site 3 - Previous Burning Ground (1950 – 1958) (This IR site is also SWMU 5)	West of Bldg. 362 and east of Fifth Street	1950 - 1958	See SWMU 5 description	See SWMU 5 description
Site 4A and Site 4B	IR Sites 4A and 4B – Spent Photographic Developing Solutions Disposal Sites (IR Site 4B is also SWMU 18 IR Site 4A is also SWMU 19)	4B is adjacent to Bldg. 181; 4A is adjacent to Bldg. 231	1959 – 1971	See SWMUs 18 and 19 descriptions	See SWMUs 18 and 19 descriptions
Site 7	IR Site 7 - Beryllium Landfill (This IR site is also SWMU 10)	Off of Route 956	1964 – 1974	See SWMU 10 description	See SWMU 10 description

SWMU, AOC, AND IR SITE DESCRIPTION AND STATUS For AREAS WITH NO FURTHER ACTON ALLEGANY BALLISTICS LABORATORY ROCKET CENTER, WEST VIRGINIA

Site Number	SWMU ID and Name	Location	Dates of Operation	Description and Wastes Managed	Status and Anticipated Additional Activities
Site 8	IR Site 8 - Explosives Wastewater Sumps/Catch Basin	Throughout the facility	1940s – 1999	See SWMU 37 description	See SWMU 37 description
	(This IR includes SWMU 37)				
Site 9	IR Site 9 - Former Acid Disposal Pit	Near Bldg. 344	1972 – 1992	See AOC F description	See AOC F description
	(This IR site is also AOC F)				

Notes:

ABL = Allegany Ballistics Laboratory

1,1,1-TCA = 1,1,1-trichloroethane

TCE = Trichloroethene

HMX = Octahydro-1, 3, 5, 7-tetranitro-1, 3, 5, 7,-tetrazocine

RDX = Hexahydro-1, 3, 5-trinitro-1, 3, 5-triazine

PCE = Tetrachloroethene

PCB = Polychlorinated Biphenyl

MEK = Methyl Ethyl Ketone

MIBK = Methyl Isobutyl Ketone

TCL = Target Compound List

VOC = Volatile Organic Compound

NA = Not Available

NG = Nitroglycerin

NC = Nitrocellulose

AP = Ammonium perchlorate

RFA = RCRA Facility Assessment

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

ppb = Parts per billion

ppm = Parts per million

ROD = Record of Decision

UST = Underground Storage Tank

RFI = RCRA Facility Investigation

RBC = Risk-Based Concentration

TPH = Total Petroleum Hydrocarbon

